Welcome to the Silicon Valley!

Also in this issue:

Hamfests and Moon Pies
Scanner Monitoring on the Internet
USCG HF Information Schedule
GRE's PSR-600 Desktop Scanner

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AR-ALPHA
Communications Receiver

Welcome to the Future!

AOR proudly introduces the AR-ALPHA, the first in a new class of professional monitoring receivers!

Designed to cover 10KHz to 3.3GHz, with no interruptions,* this receiver features a 6-inch color TFT display, five VFOs, 2000 alphanumeric memories that can be computer programmed as 40 banks of 50 channels, 40 search banks, a "select memory" bank of 100 frequencies, and a user designated priority channel. It includes APCO-25 digital and a DVR with six channels that can record up to a total of 52 minutes audio. Monitoring professionals will appreciate the world class engineering and attention to detail that makes the AR-ALPHA such an amazing instrument.

- Multi-mode unit capable of receiving AM (synchronous), ISB, RZ-SSB, USB, LSB, CW, WFM including FM stereo, NFM, APCO-25 digital, and TV in both NTSC and PAL formats
- 6-inch TFT color panel can display received video signals or depict spectrum activity over a wide choice of bandwidths including a "waterfall" function to show signal activity over a specified time period
- Composite video output on the rear panel of the unit
- Selectable IF bandwidths: 200 Hz, 500 Hz, 1 KHz, 3 KHz, 6 KHz, 15 KHz, 30 KHz, 100 KHz, 200 KHz and 300 KHz along with the ability to shift the IF.
- CTCSS and DCS selectable squelch functions
- DTMF tone decode
- Built-in voice-inversion descrambling
- CW pitch control, AGC, AFC
- Auto-notch feature
- User selectable spectrum display function from 250 KHz through 10 MHz in 1 KHz increments. Above 10 MHz bandwidth, it can display 20 MHz, 50 MHz, 100 MHz or 1 GHz, but above 20 MHz bandwidth, no audio will be available
- Resolution bandwidth is also user-selectable in increments of 1 KHz, 4 KHz, 32 KHz, 64 KHz, and 128 KHz.
- Fast Fourier Transform (FFT)
- Rear panel connections include 12 VDC power, RS-232C, USB 2.0, I/Q output with 1 MHz bandwidth, two antenna ports (one SO-239 and one Type N) and up to four antennas may be selected through the receiver's controls with the optional AS5000 antenna relay selector.
- Use desktop or with 19" rack mount

The AR-ALPHA redefines excellence in professional monitoring receivers. No wonder so many monitoring professionals including government, newsrooms, laboratories, military users and more, rely on AOR.

AOR U.S.A., Inc.
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Authority On Radio

Specifications subject to change without notice or obligation.
*Documentation required for qualified purchasers in the USA.
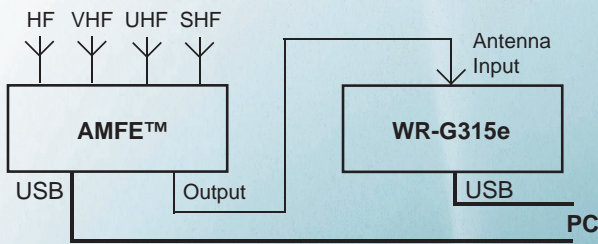
WiNRADiO®

...the future of radio.™

Now that's one very powerful brick!
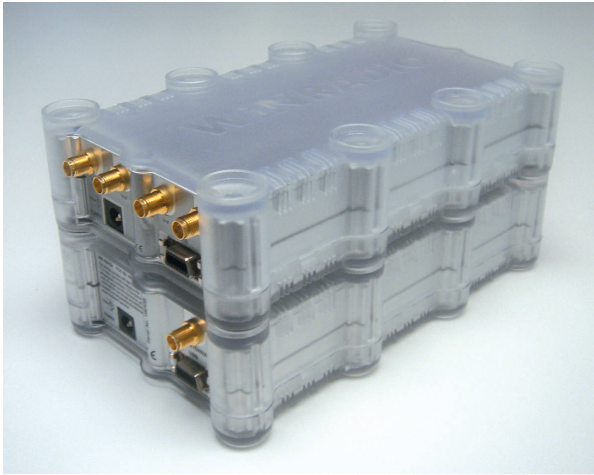
WiNRADiO WR-G315e receiver enhanced with WR-AMFE-3500

The WR-AMFE™ adds additional antenna inputs - and more.

Our latest add-on for the popular WR-G315 series of WiNRADiO receivers redefines the idea of "DC to daylight", yet again.

The frequency range of the WR-G315 can now be expanded up to 8.6 GHz using the AMFE™ option (Antenna Multiplexer and Frequency Extender). This is the first time a receiver of such affordable price range can go that high in frequency.

And you also get an antenna multiplexer thrown in, making it possible to connect four antennas for different frequency bands directly to your expanded WR-G315: No more hassle with antenna switching!

- Input frequency range DC to 3500 (or 8600) MHz
- Output frequency range 96 to 1800 MHz
- High temperature stability
- High input insulation
- High dynamic range
- Low noise figure
- Simple installation
- Integrates with WR-G315e and WR-G315i receivers
- Suitable for any third-party receivers (AMFE-8600 only)
- Low-noise linear power supply included
- Application software included
- Programmers' API included to support third-party development

The AMFE™ unit interfaces neatly with the WiNRADiO WR-G315e or WR-G315i receiver. The receiver's application software is able to recognize the AMFE™ unit and expand the ranges of the frequency input and display automatically. Switching between the antennas and tuning the local oscillator for the downconversion is accomplished fully transparently to the user. The AMFE™ enclosure is similar to that of the WR-G315e receiver and stacks neatly on top or under it.

There are two models: WR-AMFE-3500 and WR-AMFE-8600 which extend the WR-G315 receiver's frequency range to 3.5 or 8.6 GHz, respectively. The AMFE™ units are USB controlled, supplied with application software and a linear AC/DC power adapter. The WR-AMFE-8600 model can be also used with third-party receivers, and can be optionally fitted with an OCXO for enhanced stability of 0.01 ppm, to suit the most demanding monitoring and surveillance applications.

Visit **www.winradio.com/amfe** for more information.

Lead Story

Welcome to Silicon Valley

By John Mayson

Silicon Valley – home to America's high-tech corporations, research labs, and several universities – should have the latest in wireless communications for public safety, right? Not necessarily. Actually, scanning the various agencies and utilities in Santa Clara County, California, is fairly straightforward.

Come ride with us on a visit to Santa Clara and the surrounding towns, make a commute via rail to the airport, and maybe we'll even listen in on communications from the NASA Ames Research Center or the Anozuka Air Force Station – all by scanner, of course!

On our cover: Everything feels clean, new, and cutting-edge in California's Silicon Valley, home to high-tech giants like Yahoo, Google, Apple, Cisco, Hewlett-Packard and innumerable start-ups. Photos by John Mayson.

CONTENTS

Uniden's radio product manager addresses this tutorial to frustrated scanner owners who wonder why they can no longer just punch in a frequency and listen to their police department dispatch channel. Yes, many systems are now unavoidably more complicated, but understanding how things work and why, and knowing where to get some help finding frequencies and Talk Group IDs will help a lot to lower the frustration level.

Your scanner manual is still required reading, though! Sorry ...

Hamfests are great fun, anyway, but a little creativity can turn an ordinary swap meet/gabfest into something that will grab the youngsters, generate some publicity, and maybe even bring in some new hams!

Only another radio hobbyist can truly appreciate the depth of history revealed in a QSL collection. Jim Pogue was honored to be entrusted with Morris Dillow's QSL cards and has been making the acquaintance of this longtime ham who became a silent key in 1994. The collection also offers a glimpse into amateur radio history through the experience of one person, including a QSL card from the ARRL's first amateur station (hint, it *wasn't* W1AW), and the absence of QSLs from the WW II years when amateur radio operation was forbidden.
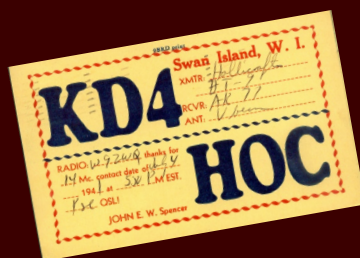
Reviews

The new GRE PSR-600 is a lot of scanner for the money, says Larry Van Horn. There is a lot he likes in this desktop/mobile, especially GRE's innovative visual and audio notification scheme, which allows you to tell at a glance (or tone) which agency or service is transmitting without having to read the screen or monitor the message. (See page 66).

If you ever despaired of culling an ID out of the static, or if you would simply like to transfer your collection of vinyl records onto a space-saving mp3 player in CD quality, go the digital route. Enhanced Audio's Diamond Cut Seven is a professional audio program offered at a consumer price. Check out part I of our review on page 68, and turn to the *MT* website for an actual demonstration of what this program can do with just a few clicks of the mouse.

So much excellent software is now available at no expense, it begs the question, is there software still worth buying? John Catalano is putting Dxtra's WorldStation V.4.2 to the test to see if it might qualify. This sophisticated receiver control program not only tunes to stations chosen from a database or from a display of active frequencies, but it can control multiple radios and it can be accessed remotely when you are away from home! Turn to page 72 to find out how.

TABLE OF CONTENTS

EDITORIAL STAFF   Email firstlast@monitoringtimes.com

GRUNDIG

60th Anniversary

TIMELESS PERFORMANCE

LISTEN TO THE WORLD

G4 WORLD RECORDER

AM/FM/Shortwave Portable
Radio with MP3 And SD player |150.00

- AM/FM-stereo and Shortwave (3000-29999KHz)
- Digital Display world-band radio
- Digital tuning methods including Auto-scan, Manual-San, Direct Key-in and Manual Tuning
- Fm Station Tuning Storage (ATS) provides automatic acquisition of the strongest stations in your area
- Built-in 1GB/2GB flash, USB 2.0 high speed transmission

CONSUMER DIGEST BEST BUY AWARD 2007

G5 GLOBAL TRAVELER

AM/FM/Shortwave with SSB | $150.00

- AM/FM-stereo and Shortwave (1711-29999 KHz)
- Single Side Band (SSB)
- Digital Phase Lock Loop (PLL) dual conversion
- Digital Display world-band radio
- Station name input features allow a 4-character input of the stations call letters

G6 AVIATOR

AM/FM/Shortwave with SSB | $100.00

- AM, FM, Aircraft Band (117-137 MHz) and Shortwave (1711-30000 KHz)
- Dual conversion
- Three types of automatic scan tuning
- 700 memories with 4 character page naming
- 3 programmable alarm timers (volume and frequency can be preset)

Receives AM Band

Receives FM Band

Receives Shortwave Band

Alarm Clock

Headphone Jack

Satellit 750
AM/FM/Shortwave Radio with SSB | $300.00

- AM, FM, Aircraft Band (118-137 MHz) and Shortwave (1711-30000 KHz)
- Set 9/10 KHz AM tuning; set FM tuning range
- Single Side Band (SSB)
- Auto/Manual/Direct frequency key-in and station memory tuning
- 1000 station memories (each band 100 memories, 500 customizable)

GS350DL FIELD RADIO
AM/FM/Shortwave Radio | $100.00

- AM (530-1710 KHz), FM (88-108 MHz) and Shortwave – continuous coverage
- Highly sensitive and selective analog tuner circuitry with AM/SW frequency lock
- Rotary volume control
- Main tuning knob and independent fine-tuning control knob
- Variable RF gain control

COMMUNICATIONS

by Ken Reitz

Rear view of the Samsung DTB-H260F shows outputs for component video (HDTV), HDMI video, "S" video and composite video as well as fiber optic audio for Dolby 5.1 surround and analog Left and Right stereo. You won't find these features on the $49 DTV converters.

SHORTWAVE/AMATEUR RADIO

VOA & RFA Step Up Broadcasts to Tibet

With the continuing strife in Tibet grabbing headlines and threatening to spoil the atmosphere at the Beijing Olympics, the Voice of America (VOA) and Radio Free Asia (RFA) will increase the amount of broadcast time beamed daily to the region. According to a report in *Radio World*, RFA will now broadcast 12 hours/day, while VOA will go to 6 hours/day in the Tibetan language. VOA will also increase its satellite TV coverage in the area.

League Slams BPL Hype

An editorial in the April issue of *QST* magazine blasted the Commerce Department's National Telecommunications and Information Administration, the FCC and the Federal Energy Regulatory Commission for vastly inflating the number of Broadband over Power Lines (BPL) subscribers. BPL was the hoped-for solution to the problem of delivery of high-speed broadband Internet to the hinterlands. The editorial quoted figures the League found in required filings by the BPL industry showing that instead of the 200,000 national subscribers touted by all three agencies and the BPL industry, "…fewer than 5,000 broadband customers received service via BPL as of December 31, 2006."

BROADCASTING

Broadcast Station Numbers Increasing

According to *Radio World* on-line, there are now 4,776 AM stations; 6,309 FM; 2,892 Educational FM; 831 low power FM, and nearly 6,000 translators and boosters on the air. But what *Radio World* found, looking back on the last 10 years, is that there was no growth in AM numbers and that the most growth was found in FM low power, translators and boosters.

Denver's 10-Year Wait for DTV

An article in *Broadcasting and Cable* magazine tells about the ten year struggle for a consortium of Denver TV stations to put a 730 foot master antenna tower on top of Lookout Mountain, west of the city. According to the article, the original plan was put forward in 1998 and ran into immediate opposition by environmental groups and other municipalities. According to the article, it literally took an act of Congress to push the project through, and included unusual efforts such as a partially underground transmitter building and a 250 foot tunnel to accommodate the various transmission lines for the four TV stations involved. The article noted that Denver is the last top 30 market to get high-power DTV stations on the air.

Star-Crossed Towers

A report from UPI noted the collapse of a tower under construction for KFI, Fullerton, California. There had been considerable debate, according to the report, about the new tower going up. The tower was intended to replace a tower that had been hit three years ago by a small airplane. According to **earthsignals.com**, an earlier version of this tower was also hit and collapsed in 1947.

Meanwhile, on the east coast, in Virginia Beach, comes a report of the collapse of a tower serving two local AM stations. According to a report from **WAVY.com**, the two stations were bankrupt and had been sold to a Michigan company pending FCC okay. The report quoted the police as saying the collapse was an act of vandalism.

Digital Conversion Madness

After spending hundreds of millions of taxpayer's dollars on the scheme to help the public convert off-air analog TV to digital, things couldn't be less clear. Consumers are confronted with a bewildering array of converters and $40 cash in their pockets, but millions of Americans will buy the wrong converter just the same.

To help clear the air (so to speak), here are some quick rules: The coupon is basically a credit

Digital off-air craziness: do you know what kind of DTV converter you should get? This Samsung DTB-H260F, off-air digital converter also supports HDTV outputs in 1080i, 720p and 480p and 480i as well as optical audio output. Cost is $180 at Best Buy.

card issued by the Dept of Commerce that says "TV Converter Box Coupon Program $40 towards the purchase of an eligible converter box." It has a serial number, a hologram seal and "valid thru" with a date that is 90 days from the time it was issued. If you haven't used the card by the valid date it's no good. Treat it like cash. The government will not issue you another one if yours is lost or stolen.

Enclosed with my coupon was a list of eight local retailers within a 30-mile radius participating in the program, plus a list of "coupon eligible converter boxes." Not all digital converters are eligible for the $40 coupon. However, while the sheet enclosed with the coupon included names of 37 models, the online list of all eligible units (provided by the NTIA) lists more than 60 [**www.ntiadtv.gov/ cecb_list.cfm**]. It must be

assumed the online list is more up to date.

Not all eligible DTV converters, however, will pass analog signals to your TV set. This means that they may, in fact, block Low Power TV (LPTV) signals which aren't required to make the switch on 2/19/09. They get a few years grace period. The list at the previously described web site indicates which do pass the analog LPTV signals. All those LPTV stations, represented by the Community Broadcasting Association, are suing the FCC in order to block the distribution of DTV converters that don't pass analog signals.

And, finally, digital TV does not necessarily mean High Definition TV. If you have an older HDTV set without a digital off-air receiver built-in, make sure you buy an HDTV-capable off-air DTV converter. It should be indicated on the box and on the unit. To be certain, look on the back of the unit for the three "component video" outputs (RCA jacks that are color coded red, green and blue). Make sure you have compatible connections between your new HDTV digital converter and your older HDTV set. It's up to the individual to know what kind of TV set they have and match it up with the proper converter.

Be aware that HDTV digital TV converters are going to be considerably more expensive than plain DTV converters. Most retail web sites offer customer reviews. Read them all carefully. You may get some tips that apply to your situation and avoid extra expense.

PUBLIC SERVICE

FCC Auction Questioned

The *Washington Post* reported that, while the recent 700 MHz spectrum auction pulled in a record $19.6 billion, the segment designated for use by public service came up about $800 million short of what the FCC expected it would fetch. According to the piece, several consumer organizations have asked the Commission to investigate reports that the auction was undermined by industry interests. The report said that the FCC will seek to re-bid that portion of the spectrum and ask the Commission's inspector general to look into the consumer organizations' complaints.

DoJ OKs XM/Sirius Merger

Sweeping aside the concerns of national consumer groups, the Department of Justice (DoJ) gave its blessing to the proposed merger of the only two satellite radio companies, XM and Sirius. The merger had been cooking on the back burner for more than a year when the DoJ finding was released. The deal is still not sealed, though. The FCC has yet to rule, but given the pro-business attitude at the Commission, there's little chance the deal won't go through. Speculation as to the results of such a merger is still sharply divided among industry watchers.

In a late development, industry sources note that the attorneys general from eleven states have issued a letter to the FCC expressing disappointment with the DoJ decision, saying that they thought the merger would be anticompetitive. They outlined a number of issues they believe the Commission should address, including a la carte pricing.

Both XM and Sirius are said to have explored various a la carte and package pricing schemes in the run-up to the merger. One plan would be to offer 50 channels from one satellite radio platform, chosen by the customer for $6.99/month with the option to add channels at $.25/each. A second scheme would give customers 100 channels of their choice for $12.95/month, to include a mix of channels from both services. Customers might also be given the option to subscribe to everything on either service for $12.95/month, basically how it is now.

Russia to Build High Power Bird

A report in *Space Daily* notes that Russia will build its first high power satellite, designated as Express-AM4. The hybrid satellite will feature 63 transponders in C, Ku-, Ka and L-bands and sport 10 steerable antennas. Carrying a 14 kW power plant, the bird is expected to have a 15 year life span and is scheduled to be launched in 2010. The satellite will be placed in orbit at 80°E.

TV Satellite Short of Orbit

AMC-14, a satellite built for EchoStar and designed to be part of the DISH Network fleet, failed to reach its intended geostationary orbit following launch on March 15. A press release from SES Americom, the company that built AMC-14, explained that, while the bird was insured against whole or partial loss, engineers may be able to use the satellite's onboard thrusters to maneuver it into its assigned orbital slot. Use of onboard fuel for such a plan would reduce the life span of the satellite. EchoStar intends to use the satellite to retransmit local HDTV channels to subscribers.

SES▲AMERICOM

In an unrelated development, but one that will hurt Echostar, DirecTV successfully launched its own new HD satellite (DirecTV 11) just days after the AMC-14 fiasco. DirecTV 11 is designed to deliver local HD stations to DirecTV subscribers.

FCC Enforcement Criticized by GAO

An article in the industry journal *Radio World* said that a Government Accountability Office (GAO) report showed that most consumer complaints filed with the FCC get short shrift. *Radio World* reported that between 2003 and 2006, 3,075 complaints involving indecency were filed at the FCC by consumers. Of those, 2,880 were closed by the Commission with no action taken.

CB Shop Busted

The FCC regularly busts CB shops around the country for two types of transceivers that are illegal for sale in the US: non-FCC certified "CB" radios that, in fact, are able to work outside of CB radio frequencies, and amateur radio transceivers that with little or no modification can be made to operate in the Citizens Band. The latest was a shop in Loveland, Colorado, which was fined $7,000 for the sale of such radios.

Sign-Off Relief

A Lancaster, California, man saw his $10,000 fine for operating an unlicensed FM station on 95.9 MHz reduced to $100 after he succeeded in showing the FCC he couldn't pay the fine, apologized for the infraction and dismantled his station.

Expensive Light Bulb

KVIN 920 AM, Ceres, California, was hit with a $10,000 fine, reduced to $8,000 for not having a top obstruction light in proper working order on one of its three towers.

60s Pirate Radio to Be Movie Theme

Mark your movie calendar for April 2009, when "The Boat that Rocked" is set to hit the big screen at a theater near you. The comedy, based on the antics aboard a '60s-era North Sea pirate radio station, is being written and directed by Richard Curtis. Stars include Rhys Ifans, Philip Seymour Hoffman, Bill Nighy, January Jones and Kenneth Branagh.

LETTERS TO THE EDITOR

A Challenge to Digital Geeks

Bob Grove and Ken Reitz have both pointed out that the analog TV audio channel provided on many portable radios and also accessible on wide-band scanners will no longer be audible after February 2009 with the conversion to digital television.

However, Ed Moor KA1TUE raises an interesting premise, given the scanners which will receive television audio reception: "How long will it take a hobbyist to rig a scanner to a converter box for audio reception of those local TV broadcasts? If the price of a digital/analog converter box drops to a modest price, can an experimenter's audio kit be far behind? Sounds like an interesting article."

Two Questions about Digital TV

William Martin of St. Louis, Missouri, wrote with two observations about the digital changeover: "I have seen no public information addressing the point that LPTV stations do NOT have to change over to digital; they'll remain on the air using their analog transmitters. I haven't even been able to determine if they will ever be forced to change to digital... How can the spectrum be 'freed' if there are still LPTV stations using it?"

Ken Reitz responded: "The reason the LPTV issue is so cloudy is that the FCC has not made a decision on the LPTV deadline. The latest from the FCC is:

While the February 17, 2009 deadline for ending analog broadcasts does not apply to low-power, Class A, and TV translator stations, the FCC will require these stations to convert to digital broadcasting sometime thereafter.

"That's as close to a firm date as they'll go. It's a big issue because there are more than 2,100 licensed LPTV stations on the air.

"Incidentally, to identify if a local station you watch is Class A or low-power, these stations are required to visually or aurally identify their call sign and community of license at sign on, sign off, and hourly. Class A stations include the suffix -CA; LPTV call signs may consist of four letters followed by the suffix -LP (for low power) or alternatively, five characters beginning with the letters K or W followed by two numbers (their operating channel) and two additional letters."

William Martin was also concerned that the elderly were the primary victims of this technological change, especially people in assisted-living and nursing homes. "I just read in the *AARP Bulletin* (March, 2008, page 8) that ... government guidelines say all coupons must be sent to 'households', which does NOT include residents in nursing homes and adult care facilities for their personal TVs."

Ken Reitz was on top of this issue as well:

"I spoke with Todd Sedmak, Communications Director for the National Telecommunications and Information Administration, which is in charge of the coupon program and he said the NTIA is aware of the issue. He noted that the law requires the coupons to be sent to individual addresses based on the census definition of 'address.' However, if individuals can specify something unique about their address they won't have a problem. For instance, John Smith c/o Shady Elm Nursing Home won't be enough. But, John Smith Room 214 Shady Elm Nursing Home will let the coupon through.

"Meanwhile, Sedmak said the NTIA will soon issue a proposal for a rule change to address the issue specifically. There will be a comment period, and this is where I expect they'll get an ear-full from those involved, and then the new rule will be declared. As for a timeline, Sedmak said the NTIA will 'fast-track' the new rule and that it will likely take effect, 'sometime this summer.'"

Rant and Rave

The following letter is in response to April's "Rant" in *Computers & Radios* about today's lack of customer service.

"I loved your 'Rant and Rave' in the April 2008 issue of *Monitoring Times*. What you wrote is unfortunately become all too true. I spent my 40 year career in Technical Support primarily networking and when I first started it was fun, challenging and a great satisfaction in helping users with their questions and problems. Retiring a couple of years ago from EveryDaySucked, the philosophy was to search a knowledgebase, find an answer that was close and then move on to the next caller. Quantity was more important than quality.

"Early this year I too had a problem installing software on my laptop. It would install ok on a desktop but would fail every time on the PC I really wanted it on. Email conversation with the vendor's support staff went nowhere. Since it installed on the desktop okay it was my problem and they wanted nothing to do with providing a solution. I was not as lucky as you, and after days of Google searching it became time to brew some coffee and spend a snowy weekend finding my own solution. Finding another vendor's driver that was causing my problem, I offered to share my solution with the first vendor. They did not even want to know what, where or how because it was not a problem with "their software."

"Knowing I would never remember how to circumvent the problem again if or when it happens again, I needed to document the solution somewhere. Years ago for fun ... I created my own website. That seemed like a good place to write about the problem and how to get around the DVD installation problem. Interestingly that page has about 30 hits per month and is now linked by several technical support sites.

"I really enjoy your column and it is always the first place I turn in each new issue."

Gary Hinton

Great Propagation

"I wanted to send a note of thanks for a great article in *Monitoring Times* on the propagation forecast [April issue]. The article was well-written, articulate, and easily understood by an inexperienced ham like myself. I have only been a licensed ham for a few months, and your article has helped me greatly. I will certainly read your future articles with great interest!"

Robert Gulley KJ4AXU

We agree that Tomas Hood does a fine job. Robert, take a look on the MT Readers site (go to the **www.monitoringtimes.com** site , click on the key, and provide the username and password found in this June issue) for a background article by Tomas entitled "Propagation, Space Weather, and You" from the April 2006 issue of *MT*. It will provide more plain-English theory behind the propagation forecasts.

PSK - It's a Community

John McCoy sent a link he thought we'd find interesting. Called PropNet, I assumed it was about propagation, and so it is. But **www.propnet.org** is actually dedicated to propagation related to PSK operation (Prop+Net). To quote the site, "PropNET is an ad-hoc, peer-to-peer wireless digital network established by experimenters who are actively exploring new communication frontiers." Check it out – You don't have to be a licensed amateur to be a receive-only participant, and the software is free.

Welcome to the Silicon Valley

By John Mayson

Welcome to the Silicon Valley! This month we're going to visit the world's home for high-tech, and of course we'll take our scanners along with us.

Like so many self-bestowed monikers, the term "Silicon Valley" doesn't refer to a jurisdiction with known and fixed boundaries. The Silicon Valley is generally assumed to be the southern part of the San Francisco Bay area in California. For purposes of this article we'll focus exclusively on Santa Clara County.

Santa Clara County sits at the southern end of San Francisco Bay. It encompasses a little over 1,300 square miles and has nearly 1.7 million residents. While smaller than the state of Rhode Island, the county boasts not only the world's home of technology but also the garlic capital of the world. Next time you use your cell phone at an Italian restaurant, remember the technology in your phone and the garlic in your pasta sauce might have originated mere miles from one another.

While driving around the northern areas of the county, familiar household names are prolific on signs and buildings. Companies such as Apple, Google, Yahoo!, Cisco, eBay, Intel, AMD, Hewlett-Packard, SanDisk, and Sun Microsystems all call the Silicon Valley home. The area has long been home to US Navy research. Moffett Federal Airfield is also here, along with NASA's Ames Research Center and aerospace giant Lockheed-Martin. Stanford University continues to produce some of the best and brightest scientists and engineers, so it's right at home in Santa Clara County along with San Jose State and Santa Clara Universities.

So, a county that's just oozing with technology must use the latest in wireless communications for public safety, right? Actually, no. Monitoring Santa Clara County is fairly straightforward. While trunking and APCO-25 digital are used, there's plenty to monitor with the most basic scanner. Let's start exploring the Silicon Valley.

Santa Clara County

The county can primarily be found on VHF. The sheriff's department uses some APCO-25 digital channels. Ambulances use conventional 800 MHz frequencies. These agencies serve in the unincorporated areas of the county and also in cities that contract these functions out to the county which include: Cupertino, Los Altos Hills, and Saratoga.

Santa Clara County Sheriff's Department

Output	Input	CTCSS	Channel Description
156.210	155.415	179.9	CONTROL 1 Countywide Primary
155.700	159.210	APCO-25	CONTROL 2 Westside
156.150	154.875	APCO-25	CONTROL 3 South County
154.650	159.600	179.9	TAC 4 Countywide tactical
154.800	159.975		TAC 5 Westside tactical
155.370	160.155	186.2	TAC 6 South County tactical
155.070	155.070	162.2	Detectives

Santa Clara County Fire/EMS

Output	Input	CTCSS	Channel Description
154.250	158.355	162.2	Primary
153.905	153.905	192.8	Command 1 Tactical Central
155.985	158.955	179.9	Command 2 Tactical Countywide
154.400	154.400	110.9	Command 8 Tactical West
154.145	154.145	192.8	Command 13 Tactical South
154.175	154.175	162.2	Tactical
153.830	153.830	CSQ	Yellow Countywide Tactical
153.845	153.845	CSQ	Blue Countywide Mutual Aid
33.960	33.100	156.7	RedNet Interagency

Ambulances

Frequency	CTCSS	Channel	Description
856.4375	192.8	MED 91	Paramedic Dispatch
857.4375	225.7	MED 92	MCI
858.4375		MED 93	Data
867.3625		MED 94	MCI
866.9125		MED 95	MCI
867.1125		MED 96	MCI
857.5125	156.7	MED 97	BAYMACS
453.1000	156.7	MED 9	Simulcast MED 91

San Jose

San Jose is the largest city and county seat of Santa Clara County. A little more than 970,000 people live in San Jose, making it the third-largest city in California and tenth largest in the United States. Despite its size and urbanization, it's consistently ranked as one of the safest cities in the country. It hosts a major international airport and a National Hockey League team, the San Jose Sharks.

The San Jose Police Department uses a conventional UHF system while fire and EMS crews can be found on VHF.

San Jose PD

Freq	CTCSS	Channel Description
460.150	131.8	1 North & Airport
460.275	162.2	2 West
460.200	136.5	3 North East
460.425	167.9	4 South East
460.400	146.2	5 Downtown
460.325	146.2	6 Central
460.475	136.5	7 South West
460.525	179.9	8 South East
460.100	179.9	9 Citywide Common
460.025	179.9	10 BAYMACS UHF 460
460.050	110.9	11 Citywide Common
460.025	CSQ	12 BAYMACS Simplex
460.175	186.2	13 Tactical
460.300	203.5	14 Tactical
460.375	203.5	15 Tactical
460.100	136.5	16 Tactical
453.650	APCO-25	17 Street Crimes
460.362	110.9	18 Special Events
460.250	141.3	19 NCI

San Jose FD/EMS

Frequ	CTCSS	Description
155.025	173.8	Dispatch
154.430	173.8	Command 2
154.115	173.8	Command 3
153.980	173.8	Command 4
155.880	173.8	Tactical 5
154.355	173.8	Tactical 6
154.010	173.8	Tactical 7
153.980	173.8	Tactical 8
154.310	173.8	Tactical 9
153.830	CSQ	County Yellow
153.845	CSQ	County Blue

Norman Y. Mineta San Jose International Airport (SJC)

Norman Y. Mineta was mayor of San Jose, served as Secretary of Commerce in 2000, and Secretary of Transportation from 2001 and 2006. He was the only Democratic member of the Republican administration. He is also the only Secretary of Transportation in history to order the grounding of all air traffic in the nation, having done so in the wake of the 9/11 attacks. San Jose's airport was named after him in November 2001 while serving as DOT secretary.

SJC is one of three major airports in the San Francisco Bay area, the others being San Francisco (SFO) and Oakland (OAK) International Airports. The airport currently has two terminals A and C. B is being built.

The airport hosts the following airlines: Alaska Airlines, American Airlines, American Eagle, Continental Airlines, Delta Air Lines, Delta Connection, Frontier Airlines, Hawaiian Airlines, Horizon Air, JetBlue Airways, Mexicana, Northwest Airlines, Southwest Airlines, US Airways, United Airlines, and United Express and cargo carriers: DHL, BAX Global, Emery Worldwide, FedEx, and UPS.

Frequency	Description
118.000	Clearance
120.100	Norcal Approach
120.700	Runway 12L/30R
121.300	Norcal Departure
121.700	Ground Control
122.950	UNICOM/Ramp
124.000	Runway 12R/30L
125.350	Norcal Approach
126.950	ATIS
134.500	Norcal Approach
135.200	Class C airspace (136°-279°)
257.600	Runway 12R/30L

City of Santa Clara

Santa Clara is a city of approximately 100,000 people. It is home to the amusement park Great America, the San Francisco 49ers training camp, and may become the future home of the NFL team.

The city operates an analog Motorola trunked radio system for all city services.

Frequencies:
866.4625, 866.8375, 867.0750, 867.3375, 867.8625, 868.6250, 868.8875 MHz

Santa Clara PD

Talkgroup	Description
16	Dispatch
48	Incidents
80	Detectives
112	Records
144	Citywide Emergency
176	Citywide Major Incident
208	Public Safety 1
240	Public Safety 2
1104	Special Ops 2
1136	Special Ops 3
1200	Patch to BAYMACS (482.3375 MHz)
1616	Supervisors
1648	Administration
1680	Command

Santa Clara FD

Talkgroup	Description
272	Dispatch 1 (simulcast on 153.965 MHz 131.8 PL)
304	Incident 2 (simulcast on 153.440 MHz)
336	Incident 3 (simulcast on 153.845 MHz 162.2 PL)
368	Incident 4 (simulcast on 154.280 MHz)
1712	Administration
1744	Battalion Chiefs
1776	HAZMAT

California's Great America

Frequency	CTCSS/DPL	Description
490.2625	173.8 Hz	Security Secondary
464.4750	173.8 Hz	Merchandising Main
490.1625	141.3 Hz	Security Main
464.6750	136.5 Hz	Operations / Maintenance
465.9000	179.9 Hz	Maintenance Chat
467.8000	179.9 Hz	Operations Chat/Tac
467.7750	179.9 Hz	Security Chat/Tac
467.8250	179.9 Hz	Entrance
465.9750	179.9 Hz	Merchandising & Food Chat/Tac
467.8500	114.8 Hz	Security Supervisor Tac
466.4250	179.9 Hz	Maintenance Chat/Tac
466.2000	141.3 Hz	Security Chat 2
467.9250	77.0 Hz	Shows/Picnic Ops
466.1250		Finance Tac
466.3500		HR Tac
467.7500		Marketing Tac
158.4000	734 DPL	Concessions

Campbell

Despite being in the Silicon Valley, Campbell isn't regarded as a "high tech" city, although eBay did get its start here. The county provides fire and EMS services to Campbell residents, and the city has its own police department which uses four UHF channels.

Frequency	CTCSS	Description
482.4625	131.8	Primary
484.2125	131.8	Tac 2
484.7875	131.8	Tac 3
482.2750	CSQ	Tac 10

Gilroy

The self-proclaimed "Garlic Capital of the World" is in the southern part of the county and a world away from the hustle and bustle of the Silicon Valley proper. All of the city's emergency services can be found on VHF.

Output	Input	CTCSS	Description
154.830	155.610	162.2	PD Primary
155.085	155.085	162.2	PD Tactical
156.180	156.180	173.8	PD Tactical
154.340	155.895	162.2	FD Primary

Los Altos

The city of Los Altos has its own police department, but relies on the county for fire and EMS services. The police department can be found on 483.0625 MHz with a CTCSS tone of 136.5 Hz.

Los Gatos

This upscale city's name means "The Cats" in Spanish. Olympic figure skater Peggy Fleming, Apple co-founder Steve Wozniak, and author John Steinbeck have all called Los Gatos home. All residents are protected by a police force with a three-channel UHF system and the county provides fire protection and EMS services. LGPD also dispatches for the Monte Sereno Police Department.

Output	CTCSS	Description
482.9125	127.3 Hz	Primary
484.6875	127.3 Hz	Tac 1
484.8625	156.7 Hz	Tac 2

Milpitas

Milpitas can be found east of San Jose adjacent to Alameda County. It's home to many of the area's computer companies. The city has its own police and fire departments that use UHF channels.

Output	CTCSS	Description
482.8625	162.2 Hz	Milpitas PD Primary
483.0125	162.2 Hz	Milpitas PD Secondary
460.6250	179.9 Hz	Milpitas FD Primary
460.5750	179.9 Hz	Milpitas FD Secondary

Morgan Hill

Morgan Hill is in the central part of the county and has the dubious distinction of being uncomfortably close to both the San Andreas and Calaveras faults making the city particularly active when it comes to earthquakes. The county provides fire and EMS services while the police department uses two VHF channels.

Output	Input	CTCSS	Description
155.115	158.790	162.2 Hz	Primary
154.965	154.965	162.2 Hz	Tactical

Mountain View

This city of 70,000 people can be found in the northwestern part of Santa Clara County. While the city has a rich history, it is today best known as being home to a young company named Google.

Mountain View Police

Frequency	CTCSS	Description
482.5125	110.9 Hz	Primary
482.7875	110.9 Hz	Secondary
483.2125	110.9 Hz	

Mountain View Fire/EMS

Output	Input	CTCSS	Description
154.025		154.995 110.9 Hz	Primary
154.830	155.610	141.3 Hz	Command 2
158.865	158.865	110.9 Hz	Tactical

Palo Alto

This city gets its name from the tall trees in the area. Palo Alto literally translates to "high stick." It is home to Hewlett-Packard and Stanford University. The city is also known as being the most expensive college town in the country with a median home cost of $1.3 million. The city's police department once shared a single VHF channel with two cities in neighboring San Mateo County. In 1980 they created their own multi-channel UHF system which they continue to use.

Palo Alto Police Department

Frequency	CTCSS	Description
482.6125	110.9 Hz	Primary
482.8125	110.9 Hz	Secondary
860.7125	110.9 Hz	All public safety phone patch

Palo Alto Fire/EMS

Output	Input	CTCSS	Description
153.770	154.445	110.9 Hz	Primary
154.055	156.060	110.9 Hz	Secondary
153.830	153.830	CSQ	Unit-to-Unit

Stanford University Police Department

Frequency	CTCSS	Channel	Description
482.6125	110.9 Hz	1	Primary
482.8125	110.9 Hz	2	Secondary
483.3375	110.9 Hz	3	
483.5625	110.9 Hz	4	

Sunnyvale

Sunnyvale sits at the heart of the Silicon Valley and shares borders with Santa Clara, San Jose, Mountain View, and Moffett Field. The city's Department of Public Safety, which includes all emergency services, can be found on the UHF band.

Sunnyvale Police Department

Frequency	CTCSS	Description
482.9625	141.3 Hz	Primary
482.4125	CSQ	MDT (data)

Sunnyvale Fire/EMS

Frequency	CTCSS	Description
482.7125	141.3 Hz	Primary
483.1625	141.3 Hz	Secondary

Santa Clara Valley Transportation Authority

This mass transportation agency uses the shorter abbreviation VTA and is responsible for rail and bus lines in its district, which encompasses most of the county. Whether you're commuting or just want to hear what's going on, you can tune into their UHF radio network.

Frequency	CTCSS	Description
488.6375	114.8 PL	Light Rail ops/Security
488.8375	114.8 PL	Bus Ops - Almaden/East/Downtown
488.7375	114.8 PL	Bus ops - South
489.0375	114.8 PL	Admin/Security Primary
482.5875	114.8 PL	Transit Security Tactical
489.1750	114.8 PL	Future Use
488.6875	CSQ	Telemetry

NASA Ames Research Center

This NASA facility is housed at the Moffett Federal Airfield. Much of NASA's research and development takes place at Ames. In exchange for a few of parking places for their Boeing 767 and two Gulfstream V's, Google's founders allow the planes to be used for scientific expeditions. Given the premium on hangar space for private jets in the Bay area, this deal raised a few eyebrows and a little bit of envy from other high-tech executives.

NASA operates an analog EDACS trunked radio system. Remember when programming an EDACS system into your scanner that the frequency order matters. At least one online source reports this system is inactive and during my February 2008 visit to the area I did not hear even a control channel.

Frequencies:
1=406.2375, 2=406.4375, 3=406.8375, 4=not used, 5=407.2375, 6=407.4375, 7=407.6375 MHz
Talkgroups (AFS format):
00-002 Fire Department, 02-021 Security, 02-132 Ramp

Moffett Federal Airfield (NUQ/KNUQ)

This facility had long been known as Naval Air Station Moffett Field. In 1994 it was turned over to NASA and is simply known as Moffett Federal Airfield. Those readers interested in federal and military air communications will want these frequencies to their scanners.

Frequency	Description
119.550	Tower
120.100	Norcal Approach
121.300	Norcal Departure
121.850	Ground
124.175	ATIS
124.175	WX ASOS
133.950	Norcal Approach
134.100	SFA
134.500	Norcal Approach
135.200	IC
135.200	Norcal Approach
251.700	Base Operations
283.000	ATIS
300.400	RDR
325.200	RDR
328.400	RDR
336.400	Ground
340.200	Tower
341.300	Weather
346.250	Tower
349.400	ALCP
363.600	RDR
380.800	Clearance Delivery

Onizuka Air Force Station

This Air Force installation is known locally as *The Blue Cube* for its large, windowless, pale-blue building at the intersection of US-101 and State Route 237. It's home to the 21st Space Operations Squadron. The facility is currently named after Lt. Col. Elliott Onizuka who lost his life board the doomed Space Shuttle *Challenger*.

OAFS uses two UHF frequencies, both APCO-25.

Frequency	Description
410.3625	Security
410.7625	Engineering and Maintenance

I hope everyone enjoyed their visit to California's Silicon Valley!

But I just want to listen to the Police.
Why does this have to be so complicated? <sigh>

By Paul Opitz
Product Manager for Uniden Radio Products

Well, unfortunately the days of "Enter this frequency to hear the police" are nearly over. Several major trends have converged that have resulted in police (and other agencies) moving to more efficient, "trunked" radio systems:

- Higher levels of radio usage have meant that there aren't enough individual frequencies available to allow every group to have their own frequency.
- Technology advances have brought down the overall cost and complexity of implementing a trunked radio system while increasing the features available to the agency and individual radio users.
- Roll-out of major statewide trunked systems makes it easier for even small agencies to "piggy back" onto the larger system for less cost than replacing existing systems.

Of course, to the average radio user, the complexity of a trunked system is invisible. Their radio is programmed up at the radio shop. They can still easily select who they need to communicate with by selecting a channel on their two-way. They can even directly call other radio users without tying up a dispatch channel… something they could never do, before.

The scanner user, on the other hand, needs to be a lot more savvy about the different types of trunking systems in use, the different options available on each system, and a host of other arcania in order to successfully monitor their favorite agency.

In this article, I'm not going to the level of arcania. Instead, this article will introduce the features that most trunking systems have in common. Once you understand this, there are other resources you can use to dig deeper.

Trunked System Basics

There are three major elements to a trunked system that you need to be familiar with before you begin:

- System Controller – Assigns voice frequencies to active channels.
- Voice Frequency Pool – Used for voice communications within the system.
- Talk Group IDs – Used to identify channels within the system.

Here's how these three elements come together in a trunked system.

The System Controller

The system controller – a special computer that assigns voice channels to users as they key up their radio. The controller is the "brains" behind the trunking system. Let's take a look at how the controller does its job.

A typical communication starts by someone selecting the channel they want to communicate on, and then pressing the PTT button on the side of their radio. This sends a channel request message to the controller that the user wants to start a transmission on the channel (Talk Group ID) that they selected. The controller sends out a channel grant message to all radios assigning a voice frequency to that channel. At this point, the original user's radio beeps and they can begin their transmission. While this sounds complicated, in real life this process takes less than half a second.

When the user releases PTT, the controller releases the Talk Group ID from the assigned voice frequency…freeing the frequency up for the next user that becomes active.
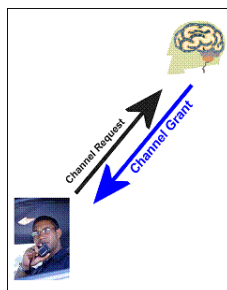
Voice Frequencies

Voice frequencies are a pool of frequencies available to the system controller for assigning voice traffic. When a frequency is assigned to an active channel, it is temporarily pulled out of the pool. When the channel is no longer active, the frequency is released back into the pool so it is available to other channels that might become active. By assigning voice frequencies to channels only as they are needed, a trunked system can support many more channels than it actually has frequencies.
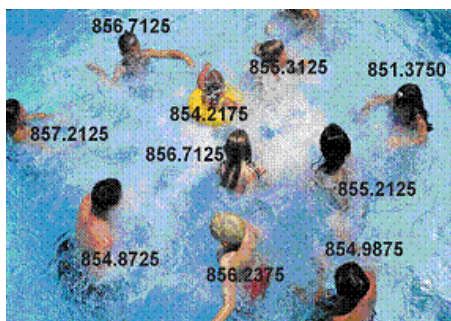
Talk Group IDs

Talk Group IDs identify who is talking on a voice channel frequency at any particular moment. Whereas in the "olden days" the frequency identified the user or agency, on a trunked system the frequency gets reused over and over by all the agencies on the system. A "Channel" is now defined by the Talk Group ID, since the Talk Group ID is what identifies the particular user or agency talking.

Channels vs Frequencies

This can get a little confusing, because the terms have been used interchangeably in the past (and to some extent, still are). For our purposes, however, on a trunked system a Channel is defined as the Talk Group ID and any other settings (such as an alpha tag, alert settings, etc) associated with that Talk Group ID.

When talking about the system itself, it is still common to refer to the "Control Channel Frequency" and "Voice Channel Frequencies." These are unfortunate facts of the radio lingo and aren't going to go away, but for our purposes, try to ignore the word "Channel" when it is used in that context.

A Real Life Example

A typical 20-frequency trunked system can support hundreds of channels. For example, the Fort Worth system includes over 400 channels providing communication support for Fort Worth Police, Fire, Ambulance, plus agencies in the surrounding cities of Kennedale, North Richland Hills, Forest Hill, Haltom City, Richland Hills, Tarrant County Sheriff, and Texas Christian University. You can see its setup in the RadioReference database at **www.radioreference.com/apps/db/?sid=31.**

Before moving to the trunked system, the Police had only 6 channels (North, South, East, West, Information, and Tactical). Since moving to the trunked system, they are now able to provide 11 channels for North Side PD alone! This provides a main dispatch channel, three "talkaround" channels, a supervisor channel, a bike patrol channel, and several community patrol channels. Other police districts have similar channels, and now special operations teams such as SWAT, Narcotics, and Traffic each have one or more dedicated channels for their use.

I think you should be getting some glimpse as to why an agency might want to switch to a trunked system. But now, let's look at how you use your knowledge of how trunked systems work to program your scanner.

Programming a Trunked Scanner

Okay, now you know a little bit about trunked radio systems. In order to actually program a trunked scanner based on that knowledge, you need to know three key pieces of information about the system before you start:

System Type
System Frequencies
Talk Group IDs you want to hear

All of this information is usually available from the database at **RadioReference.com**.

Note that I'm not going to actually program a scanner in this article…how you program the scanner depends on the specific scanner you are programming. Use the scanner's Owner's Manual for specific programming instructions.

System Type and System Voice

I recommend you look at a system setup in RadioReference. At the top of the page for a system, there is a block of information about the system:

System Name:	Fort Worth / Tarrant County Public Safety
Location:	Fort Worth, TX
County:	Tarrant
System Type:	Motorola Type II Smartnet
System Voice:	Analog
Last Updated:	*Added a set of talkgroups*
Hits:	21299

The two key lines in this block are the System Type and the System Voice. Additionally, to determine how to program the scanner, you need to look a little further down on the page to the System Frequencies.

Site Name	Freqs						
001 Primary	866.16250	866.21250	866.28750	866.36250	866.38750	866.66250	866.83750
	866.88750	867.16250	867.21250	867.26250	867.33750	867.38750	867.46250	867.66250	867.71250*	867.76250*
	867.83750*	867.88750*						

System Frequencies
Red* are Primary Control Channels | Blue* are alternate control channels | Click a Site Name for additional site information

System Type

There are five major types of systems, and some of these then have sub types. In the RadioReference database, you can generally determine the radio system type by looking at the line labeled "System Type" and at the frequencies used by the system.

P25 Systems –
These are identified in the RadioReference database as "Project 25 Standard." If the "System Type" line says anything else, then it is not a P25 system (even though it might have some P25 channels).

Motorola Systems –
These fall into several subcategories, but they will all show "Motorola Fleetnet", "Motorola Smartnet", "Motorola Smartzone", or similar. Once you have identified that it is a Motorola system, determine its subtype:
• Motorola 800 – all of the frequencies will be in the 800 MHz range
• Motorola 900 – all of the frequencies will be

Site	Name	Freqs								
101	Arapahoe Admin (Denver Metro)	866.22500	867.10000	867.36250	867.93750*	868.23750*	868.43750*	868.66250*		
102	Riley Peak (Denver Metro)	866.35000	866.60000	866.92500	867.17500	867.58750	867.73750*	868.33750*	868.58750*	868.91250*
103	Silver Heights (Denver Metro)	866.30000	866.82500	867.13750	867.38750	867.70000	867.92500*	868.20000*	868.52500*	
104	West Creek (Denver Metro)	866.03750	866.27500	866.97500*	867.31250*	867.90000*	868.93750*			
105	Mount Thorodin (Denver Metro)	866.12500	866.27500	866.46250	866.62500	866.80000	867.08750	867.23750	867.66250	867.98750*
		868.16250*	868.33750	868.55000*	868.97500*					
106	Squaw Mtn (Denver Metro)	866.16250	866.47500	866.86250	867.18750	867.45000	867.62500	867.95000*	868.45000*	868.61250*
		868.85000*								
107	Smoky Hill (Denver Metro)	764.93125	765.18125	765.43125	866.11250	866.27500	866.45000	866.73750	867.15000	867.28750
		867.47500	867.71250	868.17500*	868.40000*	868.62500*	868.87500*			
108	Lookout Mtn (Denver Metro)	854.16250	857.78750	866.11250	866.40000	866.48750	866.68750	866.98750	867.03750	867.20000
		867.41250	867.48750	868.06250*	868.41250*	868.48750*	868.77500*			
109	DRDC CF (Denver Metro)	851.15000	851.95000*	852.70000	853.47500*	853.96250*				
110	Franktown (Denver Metro)	867.97500	868.25000*	868.50000*	868.95000*					
111	Mines Peak	866.26250	866.41250*	868.22500*	868.57500*					
112	Mead	851.61250	852.42500*	852.80000*	853.38750*	853.98750*				
116	Vertamont	867.31250	867.90000*	868.11250*	868.40000*	868.93750*				
117	Tenderfoot II	852.22500	853.30000*	853.53750*	853.75000*					
118	Lamar	851.78750	852.10000*	852.60000*	852.93750*	853.23750*				
120	DTB (Denver Metro)	764.41875	764.66875	764.91875	765.16875	765.41875	851.43750	852.56250*	852.81250*	853.70000*
122	Boyero	851.23750	851.85000*	852.72500*	853.13750*	853.31250*				
123	Ramah	866.32500	866.83750*	868.03750*	868.28750*					
124	Dakota	851.96250	852.46250*	852.96250*	853.46250*					
126	Sheridan Lake	851.05000	851.28750*	852.05000*	853.07500*	853.76250*				
127	Mt. Carmel	866.61250	867.42500*	867.80000*	868.38750*	868.98750*				
128	Toonerville	866.36250	866.56250*	866.88750*	867.12500*					

in the 900 MHz range
• Motorola UHF – all of the frequencies will be between 400 and 512 MHz
• Motorola VHF – all of the frequencies will be between 100 and 200 MHz.

EDACS Systems –
These fall into three categories
• EDACS Wide – identified by a system type of "EDACS Standard."
• EDACS Narrow – identified by a system type of "EDACS Narrowband."
• EDACS SCAT – identified as EDACS Scat; these systems operate on a single frequency.

LTR Systems –
All LTR systems are identified as LTR Standard.

Conventional –
This is the general catchall for non-trunked systems, and is not really the subject of this article.

Note that there are several system types that cannot be monitored. These are identified as:
EDACS w/ESK
LTR Passport
OpenSky Standard
MPT1327
Tetra

These all either use proprietary digital formats that are not licensable by scanner manufacturers or are not used enough to be economical for scanner manufacturers to develop solutions for.

System Voice

This is a line in the database that can cause a lot of confusion. It summarizes the kinds of voice modulation used on the system, but does not define the system type. In general, you'll

System Name:	Mansfield Public Safety
Location:	Mansfield, TX
County:	Tarrant
System Type:	Motorola Type II SmartZone
System Voice:	Analog and APCO-25 Common Air Interface
Uniden DSP:	983 1985 2892
Last Updated:	*Added a single talkgroup*
Hits:	4505

find the following voice types:

Analog – can be heard with any trunking scanner.
APCO-25 – can be heard with a digital scanner.
ProVoice – cannot be heard by any scanner
VSELP – cannot be heard by any scanner

Note that, as in this example, APCO-25 can be a Voice type on a Motorola non "P25" system. It can also be mixed in with analog channels on such a system. In any event, ignore the "System Voice" line when you are trying to determine whether a system is P25 or not. This is determined solely by the "System Type." If there is P25 Voice on a non-P25 system, the scanner will determine this while scanning.

System Frequencies

The frequencies used by the system are listed in the Radio Reference database. For Motorola and P25 systems, you only need to make a note of the system control channel frequencies (these are shown in Blue and Red in the database). For EDACS and LTR systems, you need to make a note of all frequencies and their associated LCN (that is a small number right next to the frequency).(Chart shown above)

Some systems like the one shown above have multiple sets of frequencies. These are called "MultiSite" systems…each set of frequencies corresponds to a different physical antenna site.

Talk Group IDs You Want to Hear (Channels)

Once you determine the system type, look at the list of channels available for the system and make a note of the channels you want to hear. RadioReference subscribers can print out a nicely formatted hardcopy of each system that makes this task easier. Highlight the channels you want to hear and start thinking about how you want to organize the channels.
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Hamfests and Moon Pies in the Sky

By Ed Yeary W4TEY

I love hamfests! I don't care if anyone says they are down in attendance, there's too much computer crap, or it costs too much for gas these days to get there. I love hamfests, period.

Why do I love hamfests? Obviously they are radio heaven for amateur operators, but my love for them comes more from the brotherhood and camaraderie I have experienced in my attendance. It's wonderful to be able to meet new people and put faces with the voices you have been talking to on the air. A cup of coffee, a few jokes, handshakes and rubbing elbows with fellow hobbyists can't be beat.

I think this is the most overlooked facet of the hamfest. I hear people say "There really isn't anything I need" or "I can't afford anything right now." I always need human contact and can always afford meeting the great people that enjoy the ham radio hobby.

A couple of years ago I attended the Radio Amateur Club of Knoxville hamfest held in Knoxville Tennessee. It is a small hamfest compared to Dayton or Shelby, but it actually was very well attended and had quite a few dealers and flea market vendors and plenty of activities. The RACK club was founded about four decades ago and currently has approximately 300 members. It is one of the oldest and largest clubs in Tennessee. The RACK club's website can be found at **www.w4bbb.org**.

In the past couple of years, its hamfest, known as the Knoxville Hamfest and Electronics Exposition, has been held at the Kerbela temple, which was a winning decision in my opinion. Also making this a winning hamfest was the presence of the University of Tennessee Amateur Radio Club and its innovative balloon launch. UTARC was founded in 1947 and is housed in Neyland stadium, the home of the Tennessee Volunteers football team. The UTARC website may be found at **www.utarc.org**.

Balloon Launch Draws Youngsters

On that bright sunny, muggy day in June, UTARC in a fit of brilliance had planned a balloon launch carrying an Automatic Position Reporting System (APRS) transmitter, a 30 meter transmitter, and an additional payload of eight Moon Pies.

That's right, Moon Pies! (Sorry, no RC Cola for the thirsty.)

My accompanying cronies and I were looking forward to this very much, which we had learned about via the Tennessee Ham list on **QTH.com**. When we approached the back of the parking lot where the flea market was bustling, we immediately encountered youngsters and a roped off section for the launch.

Moe N4CQW, Mike KJ4Z, Dan K2VOL [great call], and David KE4FGW were our welcoming hosts. They informed us that this was UTARC's 8th balloon launch and that all had been recovered except one. The balloon in question was a latex balloon filled with helium. Tracking software was developed by Bill Brown WB8ELK, a retired NASA engineer, and it would predict where the balloon would go.

Frequencies were 144.390 for APRS on 2 meters and 10.105 CW on 30 meters. Spotters were to send in reports on the 443.500 70cm repeater owned by Scott KD4CWB.
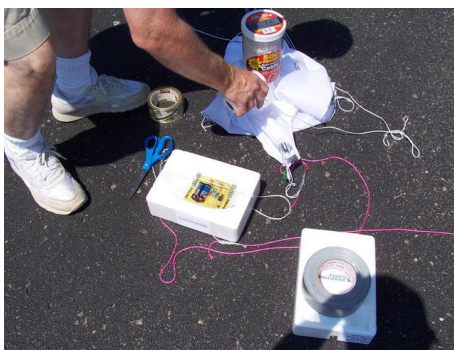
As the balloon was filled and launched, a good crowd began to gather. It wasn't long before reports began to come in on UHF and on APRS via a laptop. I had to have the help of those with better eyes as the balloon swiftly gained altitude and within a matter of minutes looked like a daytime star quickly disappearing. I was able to observe the monitor on the lap top and watch the balloon being tracked

towards the Great Smoky Mountains.

As I was unable to be a part of the recovery, I had a few questions for Greg K4HSM later on such things as altitude, location and how good the Moon Pies tasted. This is his report:

A Team Effort

There is a photo album at the UTARC web site. The address is **www.utarc.org/gallery2/** Click on the "Pie in the Sky" link**. This was UX-8, a demo flight by the University of Tennessee ARC.

Dan Bowen, K2VOL, who helped found the ballooning effort here in East Tennessee, helped supervise the team guarding the balloon against the winds. Mike Coffey, KJ4Z did the software programming and also is a "founding father." Carl Lyster, WA4ADG, built the circuit boards and designed the cutdown devices and stripped the parts down for weight purposes and built the 30m beacon. My role was primarily tank inflation and PR, as well as organizing the effort with RACK.

The person running the demo was David Hoffman, KE4FGW. He is the local 'resident expert' on real time tracking and telemetry updates from the balloon.

This whole "Pie in the Sky" mission was conceived last Tuesday after efforts on a current project were suspended until more research could be done. Dan suggested we do a "fun mission" and I suggested that we get something together for the Hamfest if they had the time and space...or is it "near space"? We then decided to do something "unusual", and at first Mike Coffey suggested a food basket

be hauled aloft, then it went to Oreo cookies, then Dan suggested Moon Pies, and we had the winner.

Within 24 hours, we had RACK's full support, and enough activity on the e-mail reflector brimming with ideas and offers, that we knew we had the makings of a wonderful demo mission.

This marked the first on-time launch, and only the second time we had beautiful weather for a launch. Up until now, most of the other missions were plagued with bad weather or low cloud ceilings.

Launch was at approximately 11:59:02, as that is the first packet received with a higher altitude, so give it +/- 10 seconds Highest recorded altitude: 25398 ft - Location: 35.51.69N by 083.40.38 W - Time of packet was 12.27.40 Last packet in flight was at 12:51:06 - Location: 35.48.18N by

083.30.73 W, altitude of 2181 feet. The packet after disconnect places the balloon at 24942 feet - Location: 35.21.65N by 083.40.17 W - Time of packet was 12:28:02.

The balloon was recovered less than two hours after launch. Jeff Napier, AF3X, recovered the payload. Travis Maclay, N4TJM headed up the recovery team.

The balloon was intentionally cut away from the payload as predictions were placing the balloon well into or beyond the Smoky Mountains by the time it came to a rest. This was the first successful test of the cutdown device. The cutdown device was on a built-in timer and once it was activated there was no way to stop the cutdown from altitude. Future versions will be based on altitude and remote control input.

Now for the real meat of the issue...the **Moon Pies** were **MELTED**. I don't think

anyone wanted any when Jeff brought them by.

Some QSL cards were placed in the payload and were returned, and we will send these out with any QSL reports received on the 30m beacon. The 30m beacon was on 10.105.

The APRS log file is online at **www.knology.net/~k4hsm/images/UX8/aa4ut-11-UX8.TXT.** I trimmed the log file to start about 15 mins prior to launch.

(*As you'll see on the club website, UTARC did repeat their balloon demo at the 2007 hamfest – with a video camera payload this time, but the balloon landed in the Smoky Mountains and the payload was not recovered - ed.*)

Draw the Youngsters!

As you can see by Greg's report, this was a very successful launch and I want to commend all involved. If more hamfests would incorporate these types of things, I feel we will be enjoying them for many more years to come.

One of the things that really impressed me with the launch is that the average age of those participating couldn't have been much more than 20 or 21. All those kids running around with APRS ready radios made me feel antiquated indeed.

If your club is planning a hamfest there are some good clues to be had here. Location, enthusiasm, participation of youngsters, and innovation are good assets to have. Support your hamfests any way you can. They are a wonderful facet of amateur radio and need not die or fade away. Maybe a Moon Pie or two is just what you need!

QSL Cards Tell Ham's Story

By Jim Pogue/KH2AR

Few love affairs last for 72 years. But for Morris Dillow, his love for radio was just that. He had many unique experiences associated with radio during his seven decades at the dials. Yet some of his other experiences were very typical for the generations of people before us who were enraptured by the sounds and voices mixed with static coming from their headphones and speakers. His story could be our story; his story is the story of amateur radio.

Although Morris became a silent key in 1994, I have had the honor of meeting him through his large collection of amateur radio QSL cards and in conversations with his grandson, Keith Norrington, who recently gave me the cards for safekeeping. They tell a fascinating story of the man and his love for radio, and provide us with a unique window into his world and times.

Bitten by the bug

Born in mid-December of 1907, Morris first became interested in radio in 1922 while a student at New Albany High School in southern Indiana. With a long string of copper wire and a galena crystal he managed to hear 500-watt WHAS in nearby Louisville, Ky. Along with WHAS he also heard a couple of hams chewing the fat. That was it – he was hooked.

Morris enjoyed listening to the radio, but going to work, getting married and starting a

W9ZWQ – Two cards used by Morris Dillow, the top one from 1937 and the bottom one from 1958.

family prevented him from earning his amateur license until 1937. In that year he drove to Cincinnati and sat for the test. Sometime later an envelope arrived in the mail from the FCC and he learned he was now W9ZWQ.

W1MK – 1935 – The earliest card in the collection, W1MK was the original ARRL Headquarters Station.

The earliest card in Morris' collection is from W1MK – the headquarters station of the American Radio Relay League. "Now wait a minute …" you may say. The ARRL Headquarters station is W1AW. Well, it wasn't in early 1935 – the date on Morris' card. Hiram Percy Maxim was still alive and happily using that call sign himself.

According to ARRL historian Perry Williams, W1UED, Maxim died Feb. 17, 1937. Later that year, the official ARRL club station W1MK was wrecked by a flood of the Connecticut River. The FCC did not promptly issue a replacement license, and soon after the flood the League decided to buy rural property high and dry, and to build the Hiram Percy Maxim Memorial Station. Rather than pursue modification of the W1MK license further, the ARRL sought and obtained Maxim's call, W1AW. On June 11, 1938, the license was modified to the new address, 225 Main Street, Newington, Conn., and operations, both scheduled (i.e., code practice and bulletins) and spontaneous contacts with other amateurs commenced soon after. The station was dedicated on Sept. 2, 1938, with the ceremony broadcast live over a national radio network.

Morris' QSL from the historic W1MK station is actually an SWL card, as the operator wrote "Thanks for report on our signals" in the remarks area.

More QSL cards begin arriving

Although the FCC began issuing "W" and "K" prefixes to existing license holders
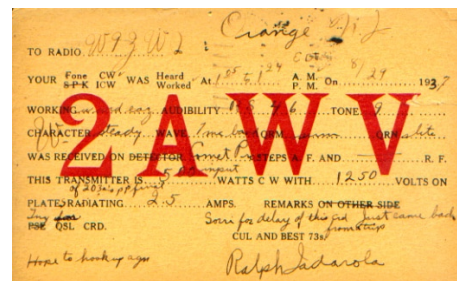
2AWV – 1937 – This card, originally printed sometime in the 1920s, still bears the operator's original old-style call sign. He has written in a "W" to make it W2AWV.

in 1928, some hams were still using their old cards to verify contacts. An interesting card in his collection was from an operator in Orange, N.J., who sent Morris a QSL for a 1937 QSO with the call sign "2AWV" in big red letters. A similar card from a 1939 contact with a ham in Mexico City still has an old-style call sign "X1BG" and "ex-X3A" on the front.

One of the great things I've discovered from looking at this collection is the way some QSL cards can also be interesting historical documents. A 1937 card from VE3ALX in London, Ontario, Canada, bears a beautiful foil seal with crown, orb and scepter, and celebrates the coronation of King George VI on May 12th of that year.

VE3ALX – 1937 – This beautiful card from London, Ontario, celebrates the coronation of King George VI, who ruled England during World War II.

I was also lucky to find one of Morris' own QSL cards from 1937 – filled out but apparently never mailed. Morris lists his receiver as a "Super Gainer" and his transmitter as a crystal-controlled 6L6PP. The Super Gainer receiver was the brainchild of Frank C. Jones, who published what was called an "every man's" type radio handbook. It gave many hams who were struggling along on a
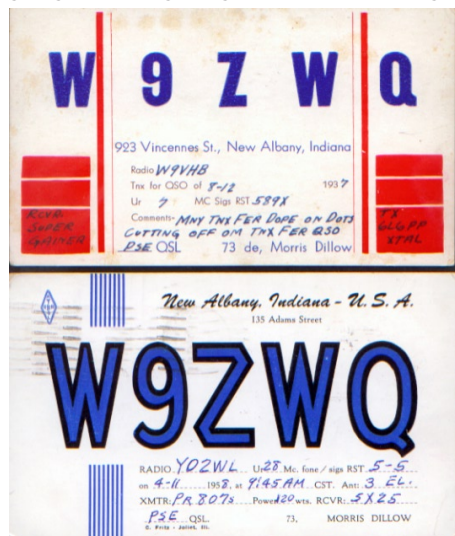
depression-era budget the chance to build versions of more expensive commercial receivers and equipment.

The year 1939 brought Morris one of his first DX contacts when he worked Honduran station HR4YV on 40 meters. Even more interesting, however, is the fact that HR4YV was operating from the yacht "Vida" and was located 700 miles west of Martinique. The card was mailed from Panama and arrived with two cents postage due – which I suspect Morris happily paid!

War clouds gather

In September 1939 attacks by Nazi Germany plunged Europe into what would soon become World War II. Many Americans suspected the United States would soon be involved, too. Thousands of our nation's hams would soon be in uniform and operating military radios instead of their amateur gear.

According to the ARRL, Presidential Order 72, issued June 4, 1940, prohibited all contacts between U.S. and foreign amateurs. Morris continued his amateur activities in early 1940 and 1941 by working a variety of U.S. stations and even a few more distant ones.

K5AU – 1940 – Sent from Fort Sherman, this one of many Canal Zone cards in the collection bears the pre-World War II prefix of "K5" instead of the more familiar "KZ5."

In his collection of QSLs I came upon a card from K5AU, located at Fort Sherman in the Canal Zone. The "K5" prefix was used instead of the more familiar "KZ5" for this American outpost prior to the war.

One of the interesting aspects of some of the cards in Morris' collection is the way they foreshadow other interesting radio and world events. For example, I found a July 4, 1941, card from KD4HOC on Swan Island in the West Indies. Swan Island would later become famous as the base for Radio Americas – a clandestine CIA station targeting communist
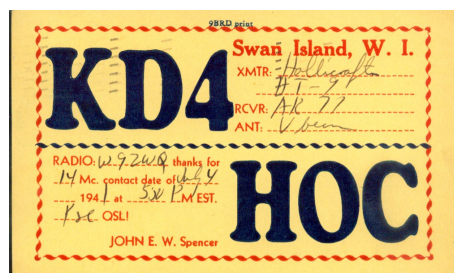
KD4HOC – 1941 – From the island that would later become famous for another radio station, this card is from an operator on Swan Island.

Cuba in the 1960s.

A June 1, 1941, card from W5ZA in Roswell, New Mexico, is interesting for a couple of reasons. Sent by operator Louis Falconi, the card boasts that he was "Winner First Hoover Cup 1921." The short-lived Hoover Cup, established by U.S. President Herbert Hoover, recognized the best amateur radio station in the United States.
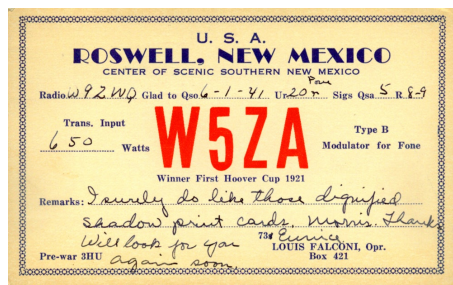
W5ZA – 1941 – Operator Louis Falconi was rightfully proud of the fact that he was the first winner of the prestigious "Hoover Cup" in 1921 for best amateur radio station in the nation.

Roswell would later become famous for some alleged long-distance visitors that local residents reported seeing. But more on that later.

Service on the home front

In late 1941, war at last came to the United States. With the Japanese attacks on Pearl Harbor, the government ordered a halt to all amateur activity on Dec. 7. They asked ARRL station W1AW to continue its bulletins announcing the ban, until final shut-down at 12:23 a.m., Jan. 10, 1942.

W9ZWQ was on the air right up until Uncle Sam pulled the plug. One card in his collection from W9FRK in Horton, Kansas, is dated Dec. 6, 1941 (There was no "zero" call sign number at this time.). Operator Lee Replogle writes on the card, "Sure made me homesick when I rcd ur QSL – CU when it's over." He also wrote a Morse code "V" for victory under his name. The card was mailed from his hometown of Horton on Oct. 31, 1942, and I can only wonder if perhaps Lee was home on leave from the military before shipping out overseas.
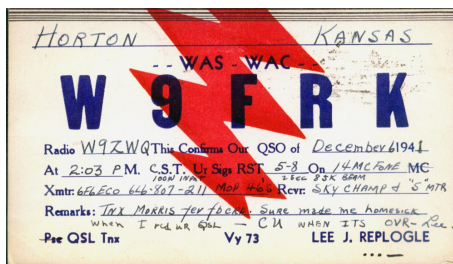
W9FRK – 1941 – This card for a QSO on the day before the attack on Pearl Harbor truly speaks to history. Note the Morse code "V for Victory" below Lee Replogle's name in the lower right corner of the card.

According to his daughter Janet Norrington, Morris was "… talking on his ham

radio when he heard a lot of 'chaotic chatter' that turned out to be due to the bombing of Pearl Harbor." That would have been Sunday afternoon in Indiana.

Morris was 34 years old in 1941, had a family to care for and also had an important job as a structural steel draftsman for the Louisville Bridge and Iron Company, situated along the Ohio River. Although he would not be inducted into the armed forces, he did his part serving as an air raid warden with the Civil Defense effort on the home front.

"One of his duties was in patrolling streets during drills to see that no lights were showing in homes," added his daughter.

Later in the war, Civil Defense stations manned by amateurs and holders of radiotelephone permits were authorized on 112 to 118.5 MHz, and some UHF frequencies, strictly for Civil Defense use under War Emergency Radio Service licenses, were issued to local and state governments. It is safe to assume that Morris may have kept his fingers in radio through opportunities like this.

Peace came to the world again on Aug. 14, 1945, when President Truman announced that Japan had accepted the Allies' terms of peace. The next day the ARRL asked the government to release amateur frequencies and let the hams back on the air.

Morris was anxious to return to the air and the large number of QSL cards in his collection from the late 1940s proves it. In addition to stateside stations, he was working lots of interesting DX, too. I found a card from ZS8A in Basutoland, South Africa; VE8NB on Resolution Island in Canada's Northwest Territories; and from many other stations in Europe and Latin America.
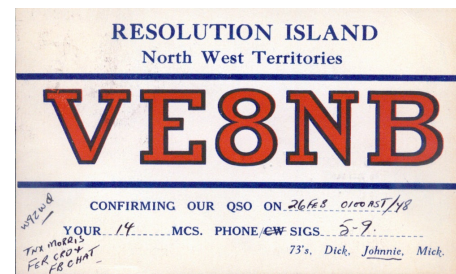
VE8NB – 1948 – Resolution Island was the location for a radar and meteorological station on Canada's "Pinetree Line" of early warning stations during the Cold War.

Unidentified flying QSL?

One of the most interesting cards in Morris' collection is from W5MNN – the base amateur station at Roswell Army Air Field (RAAF) in New Mexico. The beautiful, multi-colored foldout card bears the logo of the 509th Bomb Group and the inscription, "The only trained group in the world that has dropped an Atomic Bomb."

The date of Morris' contact with the station was Feb. 13, 1947. Less than five months later, on July 8, 1947, the Roswell Army Air Field (RAAF) public information office reported the crash and recovery of a "flying disc." Army Air Forces personnel from the
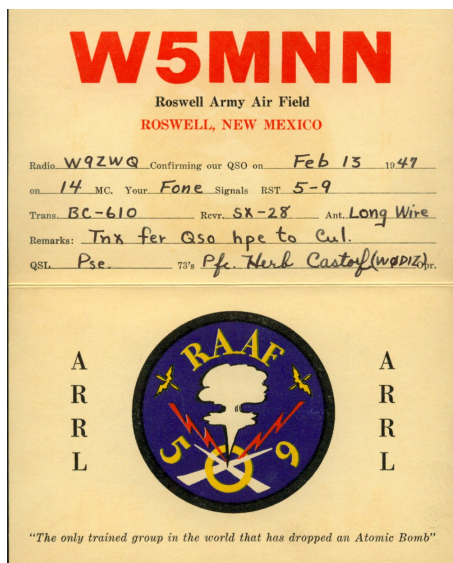
W5MNN – 1947 – The name "Roswell" says it all. Perhaps Pfc. Castorf/WØDIZ helped collect wreckage from the mysterious crash site a few months later.

RAAF's 509th Bomb Group were credited with the recovery. Although the Air Force later said the debris was from a weather balloon, many still believe a spacecraft from another world actually crashed into the New Mexico desert. In any case, Morris' card from W5MNN is another fascinating piece of history.

Dedicated to helping others

Based on the number of QSL cards in his collection, the late 1940s and 1950s were the most active amateur radio years for Morris. A 1968 article about him from the New Albany (Indiana) *Tribune* talks about the many phone patches he regularly ran for servicemen and missionaries.

Among the many QSL cards from this period are more than 50 from stations in the Canal Zone – most from servicemen stationed there. Other military stations represented include K5WAB at Fort Hood, Texas; K4USA, the Army station at the Pentagon, and W4TIS at Fort Benning, Georgia.

The Navy wasn't forgotten, either, with cards from KG4DH at the Guantanamo Bay Naval Base, Cuba; W6INF aboard the vehicle cargo ship USNS *Meteor,* and W2CIX aboard the guided missile destroyer USS *Barney.*

The 1968 newspaper article also tells of Morris' work with missionaries around the world. It relates the story of how he heard a station calling "CQ Indiana" with urgent traffic.

"I answered the call and found it was a missionary in Asunción, Paraguay, who was in need of medical supplies," Morris is quoted as saying. "He gave me a distributor's name in Indianapolis who I 'patched in' and let him get his medical supplies air-mailed the next day."

The QSL card from Frank Pickett, ZP5MO, at the Iglesia de los Discipulos de Cristo, Mision de Amistad in Asunción is the proof. "Thanks so very much for the phone
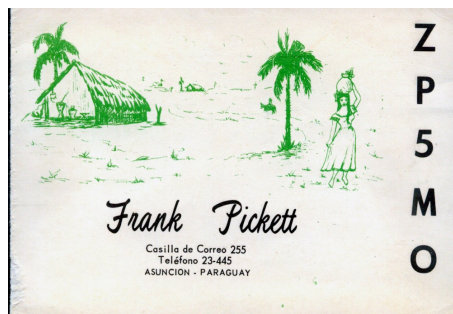
ZP5MO – 1968 – Morris Dillow helped this missionary in Paraguay get medicines he needed for the community he served. He thanked Morris on this QSL card.

patch last night," he wrote on the card. "It was the good old Indiana hospitality."

The article also tells about a Christmas eve phone patch to a missionary in Liberia, and another from a young man in New Albany to his father in Quito, Ecuador, who was "… director of station HCJB, the Voice of the Andes."

Morris said he'd also run phone patches to Okinawa, Brazil, Uruguay, Chile, Honduras and El Salvador, to name just a few. In a time before e-mails, satellite telephones, and overnight delivery services, the work done by Morris and other hams saved many lives and brightened countless lonely spirits.

Beauty and variety

The 1950s and 60s also produced some of the most beautiful and unusual QSL cards in Morris' large collection. These include:

An elegantly printed card from PY7RD in Brazil, with a green and gold ribbon representing the country's national colors attached.
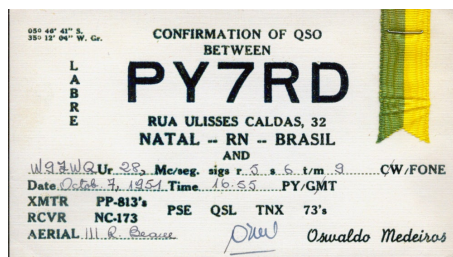
PY7RD – 1951 – A beautiful green and gold ribbon, the national colors of Brazil, adorns this card from Natal.

A card from HK3FV in Colombia, made of a solid piece of thin laminate wood.

HK3FV – 1958 – This card, from an operator in Bogotá, Colombia, is actually printed on a thin slice of real wood.

A card from K6HWT in Stockton, California, printed entirely in Braille with the alphabet key at the top to help the recipient figure out what it says.

And several cards from maritime mobile stations aboard U.S. merchant ships including the SS *Gulf Meadows*, SS *Santa Cruz*, SS *Santa Adela*, the Swedish M/V *Holmialand* and the Norwegian M/S *Moshill*.

Unquestionably one of the most interesting cards came from Venezuelan ham Ruben Segovia, YV1ST, in the Caribbean coastal city of Maracaibo. The card shows a view titled "Valle del Rio Motatán" or Valley of the Motatán River in the Venezuelan Andes. What makes it truly unique is the small (five-inch-long) pennant with Ruben's name, call letters and elements of the Venezuelan flag that is attached to the card.

YV1ST – 1979 – From Maracaibo, Venezuela, operator Ruben Segovia included this small pennant created for his amateur radio station.

Dillow's legacy

In June of 1972, Morris suffered a heart attack, but recovered and returned to work until his retirement in 1978 at age 70. He continued working lots of DX during this time, and cards from Rhodesia, Seychelles, New Zealand, Gambia, Botswana and most of the countries of Europe and Latin America fill his collection.

Sadly, Morris' wife Hazel died in her sleep of a heart attack in the early hours of Christmas morning 1990. They had been married for 61 years. That same year his health also began to deteriorate and he was confined to his bed most of the rest of his life. Morris became a silent key On March 1, 1994. Thankfully, his family kept his QSL card collection and I am honored to have become the trustee of it.

The hundreds of cards in the collection are a testament to the way ham radio played an important part in the life of Morris Dillow, and tell much about the exciting years he lived. They also demonstrate how one man positively impacted the lives of many people around the globe – most of whom he never met in person and who never had a chance to properly say 'thank you' to him.

73 Morris – and thank you from all of us.

Q. *One of your advertisers indicates that their 13 watt, screw-base, compact fluorescent (CFL) bulb will replace a 60 watt incandescent bulb with the same illumination. If my indoor light socket states that I must only use a 60 watt bulb max due to fire safety, can I safely use a 26 or even a 39 watt CFL light to produce the effects of a 120 or 180 watt incandescent light in that same fixture? And how about interference to radio reception? (Mike Elcsisin, KC2FTN)*

A. The new, screw-in bulbs are roughly four times more efficient than traditional incandescents; that means that the same amount of power drawn from the AC line will produce four times the amount of light.

Sockets and fixtures are rated by the actual power consumption, so you can get three times as much light from one if you switch to a fluorescent that draws the same amount of wattage. Conversely, to get the same amount of light that you have with an incandescent, switch to a fluorescent that draws only 1/4 as much wattage.

So far as RFI, some CFLs do produce minor shortwave RFI, but all that I've tried so far only radiate a foot or two, so you certainly won't have any problems with interference using an outdoor antenna.

I'm gradually replacing all the incandescents in our home with CFLs; shop around for the best price, usually about $2.50 per bulb in packs of three or four.

Q. *Recently, a distant FM broadcaster added a repeater near me which is on the same frequency as my favorite FM station. Will an FM beam antenna be sharp enough to separate the two signals? (Robert Compton, email)*

A. A great deal depends on the relative strengths of the two signals, and how far they are separated on a compass circle with you at the center. Whether an FM station or any other VHF/UHF communications signal, the antenna consideration would be the same.

A directional (Beam) antenna would probably do the job. You don't necessarily have to point it toward the desired signal; sometimes you simply rotate the antenna so that the offending signal arrives off the side where there is a deep rejection null. The more elements the higher the gain, and the sharper and deeper the null. Ideally, of course, the desired signal would be in front of the antenna, and the interfering signal off the side.

Q. *Into the mid-20th Century, three-wire lines could be seen stretched alongside railways. What was on these circuits, and why three wires? (J.J.O., NC)*

A. Initially, they carried telegraphy, inductively coupled between the suspended wires alongside the track and metallic strips laid along the tops of the cars. When the key was pressed, a 500 Hz buzzer modulated the Morse characters which were listened to through a telephone receiver. I suspect telephony later was used. A common ground was made through the axles of the train.

Long lines like this were vulnerable to inductive noise pickup, ground loop currents, earth currents which could unbalance the line, and so forth. For an in-depth look at old-time railway communications, visit this informative website: **http://www.telephonetribute.com/**

Q. *In your February 2008 column you mentioned the phenomenon of hearing someone's car MP3 player suddenly interrupting your FM reception as you drive close by. I hear Howard Stern on my car radio every morning as I drive by a particular location, but it's gone in the afternoon. What is this likely to be?*

A. XM and Sirius satellite converters utilize an integrated Part 15 (FCC low power designation) transmitter to rebroadcast their received signals to a car radio or home entertainment system. My guess is that such a receiver/converter in someone's car is powered through the cigarette lighter jack, but it doesn't power down when the ignition key is switched off. After he/she drives to work, you no longer hear it. But everyone within range at the car owner's parking space is hearing it just fine!

Q. *I have an inexpensive AM/Shortwave portable. Is there a simple internal modification I could make to allow it to receive local weather broadcasts? (Dave Carter, Centralia, IL)*

A. Any tunable radio can easily be realigned to change its reception frequency, but only by a small amount. This is because the components used (transistors, coils, capacitors) are selected for a specific frequency range. If you simply substitute another component, it doesn't necessarily mean that the rest of the circuit will continue to function properly at the new frequency.

Q. *I have a Grove ScanTenna which is an omnidirectional (non-directional), multiband, vertical dipole for scanners. Can I add more elements to increase gain? Doesn't reflection from the metal mast alongside the elements make it directional, thus calling for a plastic mast? Do tree leaves in the line of sight hinder performance? (Howard, email)*

A. Unless they are properly spaced and positioned, adding more elements alongside the current ones can reduce performance through phase cancellation, and, in any case, would certainly make the antenna directional. Done properly and doubling the number of elements, you would gain no more than 3 dB.

The metal mast alongside can affect the directivity of the antenna on certain wavelengths; substituting plastic would reduce this effect, but would be less sturdy than metal.

The moisture in tree leaves is absorptive to incoming signals; the higher the frequency, the more they attenuate.

Q. *Do domestic AM and FM broadcasters QSL? How about HAR/TIS stations? Is there a book available listing addresses for these stations? (Eric Hopkins, Ayer, MA)*

A. *MT*'s own QSL expert, Gayle Van Horn, says that both classes of stations do QSL. In the absence of any current, comprehensive, printed directory of these licensees, the listener must check the FCC's ULS database to get the address for any AM, FM or TIS station. TIS stations usually require a prepared QSL card be enclosed with the reception report.

Digital Off-Air TV Explained

This February marked the beginning of a well-funded, congressionally-backed, industry-craved push for public awareness of the end of analog television transmissions. Slick commercials intending to explain the switch were seen regularly on off-air and cable channels alike. Still, two months into the program I personally found a great amount of misinformation or simple ignorance on this subject from tech-savvy hams to ordinary people, the real target of the commercials. Even the owner of my local TV sales/repair shop recently called to ask about the switch. If nothing else, it really exposed the 60 second commercial as a poor teaching tool. Sell beer, politicians and cars, yes, but teach? No.

❖ Making the Switch

I have been watching off-air digital TV for more than five years and first wrote about the subject in the June 2004 issue of *MT*. At that time only a few of my local channels were transmitting in a digital format and only some prime-time programming was in HD. The first thing I noticed was that, unlike analog, you either have a perfect picture or you have no picture.

Those of us who grew up with analog off-air TV have always expected a certain amount of "snow" in the picture and we've learned to put up with it. But that's not how it works in the digital age. So, in order to ensure that you are able to watch the channels you're used to watching, you have to improve your HD off-air reception system.

But, remember, digital TV reception is not necessarily HDTV reception, whether satellite, cable or off-air delivered. Just attaching a DTV converter will not necessarily give you HDTV pictures. If you don't have an HDTV-capable TV set you cannot receive HDTV pictures. You can see digital pictures.

There are many options in the stand-alone digital TV converter box category. Look for features that are compatible with your audio system and TV set. If you're using an older TV, look for a channel 3 or 4 modulator in addition to the HD outputs. Look for standard right/left stereo outputs so that you can feed the TV audio into your stereo, but look also for fiber optic cable audio output in the event you upgrade your stereo to a surround sound system. Look for additional audio and video output to feed whatever you use for recording TV programs. Look for HDMI output if you plan to watch on a computer or LCD TV set. Look for an easy-to-use channel guide and, if possible, get one with an interactive guide.

The federal government has made available several hundred million dollars to make sure all Americans can afford to make the switch. Each household is allowed up to two $40 coupons. Applying for the coupon is easy. By now, millions have done so. Go to **www.dtv2009.gov** and follow the prompts. If you don't want to apply on line, use their toll-free number 888-DTV-2009.

But, be aware that entrepreneurs are ready to take advantage of any misstep. Any domain entered besides **.gov** will likely take you to a commercial venture where you'll be offered a "great deal" on a satellite TV system. The same holds true for dialing the toll-free number. You can use your coupon at local retailers, mail-order or web-based outlets.

In typical government program confusion, not all converters are eligible for the $40 DTV converter coupon. Not all eligible DTV converters will pass analog signals to your TV (Low Power TV stations aren't required to switch immediately on 2/19/09) and not all DTV converters will output HDTV signals. It's up to the consumer to know what kind of analog TV set they have in order to buy the DTV converter that will give them all the functions they need.

Using the $40 coupon to get the cheapest converter may not be the best idea. Many on-line retailers have customer reviews. Read them carefully. Here is a list of the current eligible DTV converters as supplied by the NTIA: **https://www.ntiadtv.gov/cecb_list.cfm**. If the converter you really need is not eligible, buy it anyway and enjoy not having to buy a whole new digital TV set. By the way, hang on to your coupon once you get it. If it's lost, the government will not re-issue it. Treat it like cash.

❖ Antenna Options

As far as antennas are concerned, nothing has changed in switching from analog to digital TV signals. They're all still electromagnetic waves and any current or former UHF-TV antenna will work. The only difference is that your receiver will require a much stronger signal to convert those waves to the digital picture.
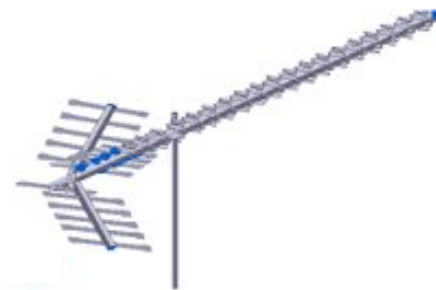
AntennaCraft MXU59 Yagi-style corner reflector with 59 elements on an 8' boom retails for $45. Pre-amp is extra. (Courtesy: Solid Signal.com)

Of course, if you're getting your local channels via cable-TV or satellite-TV, nothing will change. You won't notice any difference. But, if you're currently using rabbit ear antennas, you may have to switch to something a little better. If you're using a small UHF-TV antenna, you'll need a bigger one. You may need to add a mast-mounted pre-amplifier to help boost the signal. Although in some areas, a booster may inject extra noise which could cause your signal to deteriorate, I have not found that to be the case. In my rural area, where the signal is already marginal, I've found that a signal amplifier makes all the difference.
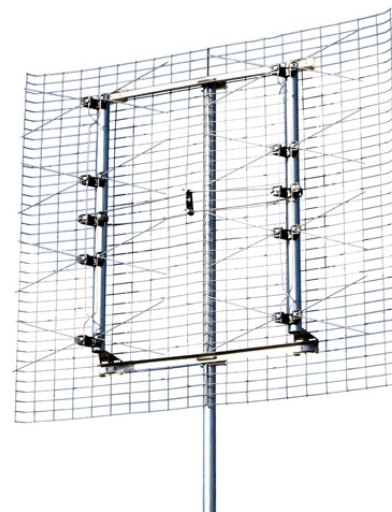
Channel Master CM4228 8 bay UHF bow-tie antenna with mesh reflector. Retails for about $30 but you'll need a UHF pre-amp. (Courtesy: Solid Signal.com)

Winegard SS2000 SquareShooter with built-in UHF pre-amp retails at $82. Very easy to hide in antenna restricted areas. (Courtesy: Solid Signal.com)

When you are considering buying a UHF-TV antenna, you don't need the large VHF portion. Those antennas are just extra weight. You're only interested in the UHF portion. In that case, buy a UHF-only TV antenna because they're cheaper, lighter, and easier to install; they take up very little room and make excellent candidates for attic antennas.

There are basically two types of UHF-TV antennas: the bow-tie reflector or the Yagi corner reflector. I've found that the Yagi corner reflector does a better job of reducing interference from the both side and back of the antenna and, by extending the boom and adding director elements, it does a better job of signal gathering. Adding a UHF-only, mast-mounted pre-amplifier can turn marginal digital reception into a drop-out free picture.

I've also found that using a rotator is a must for digital UHF reception. That's because you need all the help you can get in gathering the signal. Many cities have their transmitting antennas at opposite sides of the city, meaning that if your antenna is pointed directly at one, you may not be getting the full signal from the other. By being able to rotate the antenna just a little, you can improve reception on both.

You also need to consider the type of lead-in you use for the antenna. The best is RG/6, the same thing used on satellite TV installations. It's relatively cheap, low-loss, easy to work with, rejects interference from other in-band noise and is readily available.

Finally, you should mount the antenna as high as you can. UHF-TV signals work on

Digital Stream DSP7500T off-air digital TV converter retails for about $60. With $40 coupon that's only $20 plus shipping. (Courtesy: Solid Signal.com)

line-of-sight. Just increasing your UHF-TV antenna by 10 or more feet may make enough difference to keep the signal from dropping out. I use a large UHF corner reflector Yagi antenna with a UHF-only pre-amp on a rotatable mast at about 30 feet. This gives me drop-out free reception of almost all TV stations within a 60 mile radius.

❖ What About TV Sets?

All TV sets made today have digital tuners built-in. But, not all TV sets still on the shelf today have built-in digital tuners. Of course, the ones without the built-in digital tuners are much cheaper and, with the addition of an outboard digital tuner, you've got a TV that could last many years. With the government sponsored digital conversion coupon, you should be able to watch digital TV relatively cheaply.

You can continue to watch digital TV on your current non-digital set simply by adding the digital tuner. That's what I did back in 2003 when I added the Pro-Brand HD1150 (no longer made) to my 20 year-old Sharp TV set. I also found that putting the signal through the VCR let me record the digital programming to a regular VHS tape. Today you can do the same thing, substituting a DVD recorder for the old-fashioned VCR. The bottom line is that you don't need to buy a new TV set in order to watch digital off-air TV.

Small, portable TV sets will also work when connected to a digital converter. But, the very small (palm-sized) LCD sets will be harder to connect. And, after February 19 next year, should you have a power outage those sets will be useless. If you're planning to have a portable battery-powered TV for emergencies you'll have to have a new set. But, right now there are very few digital sets available. That will change over the next 12 months, but expect the price to remain high until volume of sales drives down the price. Also, think about having an alternative power supply for the set, as many will last only a short time on their internal battery. A good alternative is to have a connection to a deep cycle battery with the appropriate power supply and connector.

Portable radios that tune the VHF-TV band will be similarly useless after February19. The first reason is that virtually all digital transmissions take place on the UHF-TV band and, to my knowledge, there are no cheap portable UHF-TV band radios. The second reason is that the audio transmitted on digital TV signals is also digital and can't be received on an analog receiver. So, even if you're using a scanner to listen to UHF-TV stations now, that will not work next year.

❖ Last Word

It's easy to lapse into conspiracy theory mode and see the transition to digital off-air TV as a plot hatched by the cable-TV and satellite TV industry. Their argument is: switch to cable and you'll get all your off-air channels and more without having to buy a converter or put up a new antenna or buy a new TV set. No doubt they'll benefit from a certain amount

of resignation to the problem and signing up with cable or satellite may seem the easiest, if not cheapest, way out. But, off-air TV actually holds some promise as competition to the cable-TV industry if stations are smart enough to seize the opportunity.

I've seen local channels adding second and third program channels, offering everything from weather to competing network fare. In many areas where there had been five or six off-air analog channels, there are now 15 or 20 digital channels. To be sure, some of the programming is duplicative, several channels are airing nearly identical weather channels, but others are not.

One of the biggest changes in my area has come from the local PBS station which is now multicasting three channels where there had always been only one before. One channel is the PBS-HD program line-up, the second is the PBS regular program line-up and the third is a re-transmission of MHz Network programming, which includes news and entertainment from around the world, programming not available even on the local cable system.

Further, the FCC, in its recent ruling on off-air digital TV, has left the door open to subscription-based programming. It would be entirely possible for existing cable channels to contract with local channels to air their programming on secondary multicast channels or for new channels to emerge as off-air secondary networks. The future of off-air digital TV is worth watching.

Scanner Monitoring on the Internet

We recently conducted an online survey on the *Monitoring Times* website about what audio services hobbyists like to listen to on the internet. Imagine our surprise when the final results were tabulated and public safety scanner listening was the decisive number one choice of the respondents.

So what is the lure of monitoring public safety services via the net?

As most scanner enthusiasts already know, monitoring public safety band communications is limited to the received station's line of sight in the VHF and UHF portions of the radio spectrum. But using a computer, some software, and a scanner, that line of sight limitation is no longer a problem, which means that thousands of radio enthusiasts can now enjoy local police and fire communications from a distance.

❖ What do you need to get started?

Like other services we have mentioned in previous columns, all you will need to tap in on the action is a computer, internet access (dial-up or high speed access), and some software, such as your Windows Media Player, Winamp or other audio decoding package. We have included links to the major software packages used in audio streaming in our *GlobalNet* Audio Software Resource Guide.

The next step is to point your browser to the internet links that are streaming public safety communications. One of the easiest ways to get started is by using one of the internet scanner audio link portal websites. There are several nice net portals available that will get you into the thick of the action.

❖ Internet Scanner Portals

Scannerfeeds.us is the world's largest compilation of live scanner feed information and miscellaneous pages related to scanners and emergency services. At press time they had a total of approximately 1800 links (more than 1500 feed links) and around 900 members (membership is free and the site is donation driven).

In addition to scanner audio links, you will find message boards, online polls, feed setup tutorials, website hosting, and much more.

There are public safety links on this portal site from all 50 states, Australia, Canada, Chile, Netherlands, Sweden, and the United Kingdom. While not strictly public safety, one of the more unusual links we found on this site is an audio feed from Russian CB channel 19 (27.635 MHz) originating from Saint Petersburg, Russia.

In addition to public safety feeds, this site lists audio streams for NOAA weather radio broadcasts, a few ham radio audio reflectors, various air traffic control feeds from around the world, and several javaradio links. Javaradio allows the user to not only receive audio but also control a remote receiver or scanner via the internet.

Another portal that does not require registration is **www.livepolicescan.com**. Like **Scannerfeeds.us**, this site does not host any of the scanner feeds that are listed on the site, they just provide the links to them that are owned and operated elsewhere on the net. Here you will find links to all 50 states and four countries. They even have a free toolbar that you can download. This toolbar provides the following functions:

Instant access to LivePoliceScan scanner pages from anywhere on the web
Includes a cookie cleaner, a history cleaner, and a cache cleaner
Get notified when you receive new e-mails to your POP3, Yahoo!, Gmail, or Hotmail accounts.
Listen to online radio from the toolbar, the radio is even pre-loaded with some local stations to get you started (with hundreds more to choose from).
Search from anywhere on the web
The toolbar is easily customized by adding or removing various user defined toolbar components.

Another major player in the scanner portal world is **The Listening Post**. This site offers the visitor everything from police, fire and EMS to military aircraft audio streams. The service is free and, like most sites, if you register there are some extra goodies that you will be able to access. The first link I tried on this website was streamed off the Shoutcast audio server (see below) and I monitored a scanner in Anchorage, Alaska, loaded with police and fire dispatch on the right audio channel and local air traffic control frequencies in the left audio channels. Obviously there were two scanners feeding this link and it was a lot of fun to monitor.

❖ Teamspeak Streaming Audio and Chat

The **Scannerbuff Network** operates a dedicated audio streaming, voice, and text chat using the acclaimed Teamspeak software. TS, as it is known for short, is free software originally designed for gamers to communicate while they played on-line games. But TS has proven remarkably adept at streaming radio communications. It also allows text or voice conversations while radio audio is streaming.

The Scannerbuff TS server is somewhat unique in that it is a dedicated web server located in a multi-million dollar data center located in Las Vegas. This allows many users on-line at anyone time. This is compared to a TS server located on a home computer connected via DSL or cable that is limited by its maximum upload speed (usually no more than 128k.)

If you want to monitor the audio services on this website, you will have to download the free Teamspeak software (link in our Audio Software Resource Guide). Once you
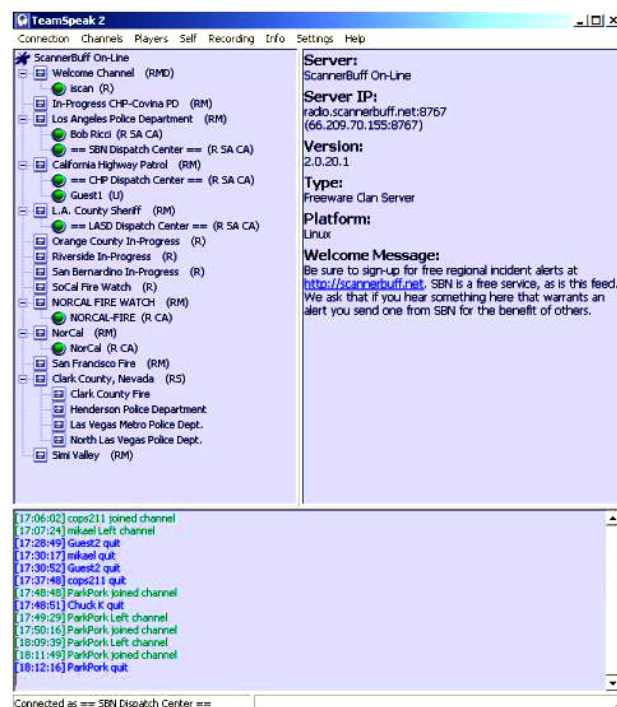
have downloaded and installed the software, to access the network of streaming scanner links, connect via the TS software to **radio.scannerbuff.net:8767**. You will find links to various public safety agencies in Northern and Southern California.

If you want to set up a channel on their server, all you need is a scanner connected to your computer. Permission is required of the site administrators, and complete advanced streaming instructions are available on their website.

In addition to the Scannerbuff Network mentioned above, there are other scanner links on the Teamspeak server. The **Incident Broadcast Network** (TS Server IP: **www.incidentbroadcast.com:8768**) has an extensive series of public safety links from around the country. Some of these links include agencies in Alberta Canada, California (including San Diego PD/FD), Colorado, Connecticut, Illinois (including the Chicago PD/FD), Indiana, Kansas, Maryland (including Baltimore County FD), Massachusetts, Michigan, Minnesota, Missouri, Nevada (Las Vegas PD/FD), New Hampshire, New Mexico, New York (including the NYFD), North Carolina, Ohio, Ontario Canada, Pennsylvania, Utah, Virginia, Washington, and West Virginia.

There are other TS groups with audio feeds on this server, including feeds for Fairfax County Virginia, Johnstown Pennsylvania, Laclede County Missouri, Mesa County Colorado, various agencies in New England, British Columbia Canada, and the Washington DC fire dispatch. As you can see there is a lot to explore in the world of Teamspeak audio.

❖ **Shoutcast Server**

Another interesting audio server on the net that has a major public safety audio streaming presence is **Shoutcast**. This server uses the WinAmp Media Player, so you will have to download it in order to utilize the service, but both downloads are free. There are more than 200 scanner audio streams on Shoutcast, including an APCO 25 stream from the Miami and Miami Beach PD, the aforementioned Anchorage Alaska stream, a UHF CB repeater audio stream in Brisbane sponsored by Icom Australia, and several railroad audio streams, to name a few.

Speaking of railroads, there are a lot of scanner fans who prowl the VHF spectrum for railroad communications (check out our regular *Trains* column here in *MT* for more details). You folks are well represented in the internet streaming world at the **RailroadRadio.net** website. This site categorizes its audio links by time zone. It also includes three rail audio streams from Canada and Australia. So if you need a rail fix and you aren't close to the tracks, give RailroadRadio a tune on your browser.

Butel has gotten into the world of streaming audio with their Eazystream website. If you use Butel software to load and control your scanner, you may be interested to know that they also have server software for sale that will let you stream your audio directly from your home computer. Not only will the software send your audio out over the net, but in addition to providing others receiving it on the other end with audio, it also displays frequency and talkgroup information (if it's a trunk system) across the net.

Even though few folks appear to be using Butel to stream scanner audio systems yet (judging by the listing on their website), having the ability to not only hear, but see the frequency/talkgroup information really enhances listening to public service agencies across the net.

And finally, there is another service/software package available along the same lines as the Butel package mentioned above, and it is produced by Proscan. The Proscan software also includes streaming audio and data, client recorder and history logging, easy setup, and requires no other programs to operate. Even if you don't own the Proscan software, there is a free client software package that can be downloaded from the Proscan website. It includes a real time list of published servers online (about 30 streams at press time). There is no need to own a particular scanner to hear and see the scanners online through this service.

❖ **And Finally…**

So far we have received a lot of nice comments on our new *GlobalNet* column.

• Bob Paciorkowski writes, "I thoroughly enjoyed your article on internet radio and was fascinated with your tip on **reciva.com**. I have dial-up, so I guess there aren't any stand-alone internet radios out there for me. Most of what I've read about requires a broadband connection. Also, I'm a milcom listener. Is there an internet streaming site that I can check out for milcom? And I'm looking forward to your future articles on *GlobalNet*."

Remember, Bob, even if you only have a dial-up connection you can still listen to audio via the net on your home computer. As for Milcom transmissions, there aren't too many, but on the Teamspeak server there is a Milcom feed out of the DC area. Once you have downloaded the software and gotten on line, connect to the TS IP address of 12.172.250.250. You will be rewarded with some milair and mil trunk communications.

• And this from Paul in Hawaii, "Aloha Larry. There really is a lot out there (the internet) especially foreign domestic stations on the Net where you get a better idea about the nation than, say, on their world broadcasts. The BBC World Service seems to be full of doom and gloom, unlike, the Domestic BBC Radio 1, 2, 3, 4, 5 (Five Live Sports) and 7 (Drama/Comedy Archives) which are not.

"Because of CC&R antenna restrictions, I have used Echolink into distant repeaters and have operated distant HF rigs remotely through Echolink. Remote HF receivers and airport tower streaming are fun, too. I'm sure the new column will expand, although you might get some flak over it. *MT* will evolve nevertheless." - Paul KH6/G3SEA

• And Bob mentioned airport towers, so next month we will feature some goodies from that part of the radio hobby via the net. Until then 73 and good hunting.

SCANNING REPORT

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Scanner Mismatches

For a new listener, selecting the proper scanner can be a confusing process. Features, specifications and capabilities might not match what is needed to hear local activity. This month we take a look at a couple of scanners that don't quite fit the needs of the listener.

❖ Connecticut

Howdy, a friend of mine suggested I contact you about a problem I'm having with monitoring trunking systems. I'm new to scanning trunking systems, so when Radio Shack put the Pro-528 on sale I jumped on it. The included instructions seemed shy of all the steps needed to scan trunking systems so I researched postings from a Yahoo scanning group.

They suggested just entering the control channels. This got to the point of seeing talk group IDs, however there is no audio. I got the control channel frequencies from Radio Reference and the TGIDs seem consistent with Connecticut State Police in my area. What am I doing wrong?

Craig in Connecticut

The PRO-528 is the handheld version of the PRO-433 and is capable scanning Motorola, EDACS and LTR systems. It can store up to 1,000 channels in 100 banks. For Motorola systems, the PRO-528 has a "Control Channel Only" scanning option and has a selectable channel plan for 800 and 900 MHz. Only one site or system can be programmed per bank.

Unfortunately, despite all of these desirable features, it lacks a critical capability – it cannot monitor APCO Project 25 digital transmissions.

The Connecticut State Police uses a Motorola Type II trunked radio system which carries voice traffic in digital rather than analog form. The voice traffic follows the APCO Project 25 Common Air Interface (CAI) standard, and therefore requires a digital-capable scanner to hear conversations. The radio system does use the older control channel format, the 3600-baud

Motorola protocol, which explains why the PRO-528 can display the correct talkgroup identifier.

You will need to upgrade to a digital scanner. Any of the models on the market will work just fine for monitoring the Connecticut digital system. You can read more about these models on my web site at **www.signalharbor.com**.

The Connecticut State Police is divided into Districts and Troops based on geographic location. The following tables provide an idea of what area of the state is covered by these divisions.

District	Headquarters
Eastern	Norwich
Central	Meriden
Western	Litchfield

Troop	Location
A	Southbury
B	Canaan
C	Tolland
D	Danielson
E	Montville
F	Westbrook
G	Bridgeport
H	Hartford
I	Bethany
K	Colchester
L	Litchfield
W	Bradley International Airport

Frequency assignments for repeater sites are generally organized geographically according to the police troops each site serves.

Troop(s)	Frequencies
A and I	866.2750, 866.6375, 867.1375, 867.7000, 868.3125
B-1	866.1375, 866.6125, 866.8625, 867.2250, 868.6125
B-2	867.2000, 867.5875, 868.2000
B-3	855.2125, 857.2375, 859.9375
C and K	866.2125, 866.4375, 867.2625, 867.6500, 868.9125
D	866.7125, 867.2000, 867.5875, 868.2000, 868.7500
E	866.1125, 866.8250, 867.1625, 867.6250, 868.3375
F	866.3000, 866.7500, 867.0750, 868.1625, 868.5625
G	866.7125, 867.2000, 867.5875, 868.2000, 868.7500
H	866.4000, 866.9375, 867.4125, 867.7625, 868.2625
L-1	856.4875, 857.4875, 858.4875, 859.7625
L-2	855.2125, 857.2375, 859.9375
L-3	866.2125, 866.4375, 867.6500
L-4	858.7625, 859.4875, 860.4875

The following are talkgroups active on the Connecticut statewide radio system.

Dec	Hex	Description
48	003	Troop A (Dispatch)
80	005	Troop A (Car-to-Car)
816	033	Troop B (Dispatch)
848	035	Troop B (Car-to-Car)
1616	065	State Police Troop C (Dispatch)
1648	067	State Police Troop C (Car-to-Car)
2416	097	State Police Troop D (Dispatch)
2448	099	State Police Troop D (Car-to-Car)
3216	0C9	State Police Troop E (Dispatch)
3248	0CB	State Police Troop E (Car-to-Car)
4016	0FB	Troop F (Dispatch)
4048	0FD	Troop F (Car-to-Car)
4816	12D	Troop G (Dispatch)
4848	12F	Troop G (Car-to-Car)
5616	15F	Troop H (Dispatch)
5648	161	Troop H (Car-to-Car)
6416	191	Troop I (Dispatch)
6448	193	Troop I (Car to Car)
7216	1C3	State Police Troop K (Dispatch)
7248	1C5	State Police Troop K (Car-to-Car)
8016	1F5	Troop L (Dispatch)
8048	1F7	Troop L (Car-to-Car)
8816	227	Troop W (Dispatch)
8848	229	Troop W (Car-to-Car)
16016	3E9	Statewide Common 1
16048	3EB	Statewide Common 2
16080	3ED	Statewide Common 3
16432	403	State Police Western District
17648	44F	State Police Western Traffic 1
17680	451	State Police Western Traffic 2
17712	453	State Police Western Administration
17776	457	State Police Western Major Crimes Unit
17808	459	Western District Common
17840	45B	Western District Regional
19248	4B3	State Police Central Traffic 1
19280	4B5	State Police Central Traffic 2
19312	4B7	State Police Central Administration
19376	4BB	State Police Central Major Crime Unit
19408	4BD	Central District Common
19568	4C7	Central District Regional
20816	515	Mutual Aid/Emergency
20848	517	State Police Eastern Traffic 1
20880	519	State Police Eastern Traffic 2
20912	51B	State Police Eastern Administration
20976	51F	State Police Eastern Major Crime Unit
21008	521	Eastern District Common
21040	523	Eastern District Regional
32016	7D1	State Police Announcement
32048	7D3	Statewide Narcotics Task Force 1
32080	7D5	Statewide Narcotics Task Force 2

32176	7DB	Connecticut Telecommunications Services
32240	7DF	Division of Fire Emergency and Building Services
32272	7E1	Mobile Command Post
32304	7E3	Training Academy (Dispatch)
32336	7E5	Training Academy (Car-to-Car)
32368	7E7	Emergency Service Unit 1
32400	7E9	Emergency Service Unit 2
32432	7EB	State Police
32496	7EF	Crosspatch
32528	7F1	Crosspatch
32560	7F3	Crosspatch
32592	7F5	Crosspatch
32624	7F7	Crosspatch
32816	803	Governor Security Detail
32848	805	State Police
48048	BBB	Emergency Restoration Vehicle 1/ Special Events A
48080	BBD	Emergency Restoration Vehicle 1/ Special Events B
48112	BBF	Emergency Restoration Vehicle 1/ Special Events C
48144	BC1	Emergency Restoration Vehicle 1 / Special Events D
48176	BC3	Emergency Restoration Vehicle 1 / Special Events E
48208	BC5	Emergency Restoration Vehicle 2 / Special Events A
48240	BC7	Emergency Restoration Vehicle 2/ Special Events B
48272	BC9	Emergency Restoration Vehicle 2 / Special Events C
48304	BCB	Emergency Restoration Vehicle 2 / Special Events D
48336	BCD	Emergency Restoration Vehicle 2 / Special Events E
48368	BCF	Department of Motor Vehicles (DMV)

Despite the effectiveness of the digital system, there is still a significant amount of analog activity throughout the state. A PRO-528 scanner will easily monitor activity on the following frequencies.

Freq	Description
33.78	Statewide Fire Mutual Aid
45.86	Law Enforcement Mutual Aid
46.16	Statewide Fire Mutual Aid
154.295	Intercity Fire Mutual Aid
155.340	Statewide Medical Net
153.815	Office of Emergency Medical Service
462.950	Med 9 (Bridgeport/Waterbury/Redding)
462.975	Med 10 (Hartford//New Haven/ Norwalk/Danbury)
463.000	Med 1 (Southbury/Newton)
463.025	Med 2 (Cheshire/Prospect /Sharen/ Trumbull)
463.050	Med 3 (LCD Hospital)
463.075	Med 4 (LCD Hospital/Stamford)
463.100	Med 5 (Hospital Patch)
463.125	Med 6 (Hospital Patch)
463.150	Med 7 (New Milford)
463.175	Med 8 (Hospital Patch)
858.2625	State Police Emergency Radio Network

Connecticut also makes use of a set of frequencies when on the scene of emergencies.

The Statewide Tactical On-Scene Communications Systems (STOCS) allows emergency personnel to communicate directly with each other when they are operating at the incident site. The STOCS frequencies were selected to work with existing portable radio equipment and are grouped into five sets of VHF, UHF and 800 MHz frequencies. The maximum transmit power allowed on these frequencies is five watts, so it might be difficult to monitor these frequencies unless you are close to the scene. (Table below)

Connecticut State Police Emergency Radio Network (C-SPERN) is a single analog channel simulcast through 39 repeater sites across the state. You can hear it on 858.2625 MHz.

❖ Florida

Hi Dan,

I'm about as new as you can get to the world of shortwave radios and scanners. I found your column and web site in a recent edition of Monitoring Times, and have already found it quite helpful. I had no idea you could listen to so much, but don't really know where to begin with it all.

After reading up on it, I ran out to Radio Shack to pick up a cheap scanner. It's a PRO-82 Radio Shack handheld, and it seems to work pretty well. But it's obvious there are some serious advanced scanners out there offering much more.

I'm just a beginner however and wanted to start small.

Do you have any particular advice to get the most out of my scanner or any suggestions/ resources for someone very new to the world of radio communications?

I live in Brandon, Florida (Hillsborough County).

Lou in Florida

Brandon is located just east of Tampa in Hillsborough County, on the western coast of Florida. It has grown from just 1,600 residents in 1960 to nearly 90,000 today and is primarily a bedroom community for Tampa.

The PRO-82 Lou mentions is a 200-channel handheld scanner that covers three broad frequency bands: 29 to 54 MHz, 108 to 174 MHz and 380 to 512 MHz. These frequencies typically have transmissions related to amateur radio, commercial aircraft, and a variety of public safety activities. The scanner has five "one-touch" buttons to quickly select Marine, Fire and Police, Aircraft, Amateur Radio and Weather frequencies. It also has a weather alert feature that sounds an alarm when the National Weather Service issues a warning. A computer interface is available to transfer channel programming into the scanner from a personal computer.

Although the PRO-82 is on the "simpler" end of scanners, since it lacks the ability to followed trunked radio systems or monitor digital transmissions, it is a terrific scanner for new radio hobbyists. It's easy to program and simple to understand, with features that make it convenient to quickly add and remove frequencies.

Brandon is close enough to Tampa that Lou should be able to monitor the city's public safety agencies. The following is a list of frequencies and the services that use them. Programming these frequencies into the PRO-82 should yield plenty of activity, especially for the Police and Fire dispatch channels.

Frequency	Description
151.145	Fire and Emergency Medical Services Fireground 2
151.220	Fire and Emergency Medical Services Tactical
153.800	Fire and Emergency Medical Services Repeater
154.220	Fire and Emergency Medical Services Fireground 1 (Airport Operations)
154.430	Fire and Emergency Medical Services (Dispatch)
155.610	Port Authority
453.2500	Solid Waste Disposal
453.3250	Police District 2 Sector D
453.4500	Parks
453.5000	Police District 3 Sector E
453.5500	Police District 1 Sector B (South of I-275)
453.6000	Public Works
453.6375	Lowery Park Zoo
453.7000	Police District 1 Sector A (North of I-275)
453.7500	Police Records
453.7750	Sewer Service
453.8000	Police District 3 Sector F
453.8500	Police Tactical
453.8750	Police District 2 Sector C (New Tampa)
453.9000	Water Service
453.9625	Police Air Service
458.2625	Police Tactical
458.7375	Police Tactical
458.9375	Police Tactical (Stadium Events)
460.1125	Police Special Squad
460.5125	Police Tactical Response Team

Hillsborough County operates a trunked radio network for the Sheriff and County Fire Departments, as well as several other agencies. The network uses a technology called EDACS (Enhanced Digital Access Communications System) and is made up of two separate systems, identified as East and West. Each system is capable of transmitting voice in either analog form or in a digital format known as ProVoice. Although there is no consumer scanner that can monitor ProVoice transmissions, most trunk-tracking scanners can follow analog EDACS activity.

Unfortunately for Lou, the PRO-82 is not a trunk-tracking scanner and cannot follow the

Name	VHF	UHF	800 MHz	Counties
STOCS-1	154.4525	458.4625	855.9875	All
STOCS-2	158.7375	458.7125	855.7125	All but Fairfield
STOCS-3	159.4725	458.8625	858.4625	All but Fairfield and New London
STOCS-4	158.7375	458.7125	860.2375	Only Fairfield
STOCS-5	159.4725	458.8625	856.2625	Only Fairfield and New London

conversations taking place on the Hillsborough County trunked radio network. However, if Lou upgraded to one of the many EDACS-capable scanners available in the new and used marketplaces, he'd be able to monitor county activity.

As with all EDACS networks, the frequencies for Hillsborough County must be entered in Logical Channel Number order, as listed here:

Hillsborough County East System		Hillsborough County West System	
LCN	Frequency	LCN	Frequency
01	866.3750	01	866.2250
02	866.7000	02	866.7500
03	867.9125	03	867.0625
04	868.2750	04	868.5250
05	868.6000	05	868.7125
06	868.8250	06	868.7375
07	866.1250	07	868.1250
08	867.5500	08	866.2500
09	867.8000	09	866.4125
10	867.6500	10	866.7250
11	866.5625	11	867.0375
12	866.8125	12	868.1000
13	867.3125	13	868.3000
14	868.2500	14	868.6875
15	868.5750	15	867.4000

In EDACS networks, conversations are identified by talkgroups specified in either decimal or Agency-Fleet-Subfleet (AFS) format. The following is a list of talkgroups on the Hillsborough County network.

Dec	AFS	Description
256	02-000	Law Enforcement Agency Call
272	02-020	Sheriff Patrol Fleet Call
273	02-021	Sheriff District-1 Dispatch
274	02-022	Sheriff District-1 Street Crimes
275	02-023	Sheriff District-1 Information
276	02-024	Sheriff District-2 Dispatch
277	02-025	Sheriff District-2 Street Crimes
278	02-026	Sheriff District-2 Information
279	02-027	Sheriff District-3 Dispatch
280	02-030	Sheriff District-3 Street Crimes
281	02-031	Sheriff District-3 Information
282	02-032	Sheriff District-4 Dispatch
283	02-033	Sheriff District-4 Street Crimes
284	02-034	Sheriff District-4 Information
285	02-035	Sheriff Warrants Division
286	02-036	Sheriff Tow Requests/Warrant Checks
288	02-040	Sheriff Tactical Fleet Call
289	02-041	Sheriff District-1 Tactical
290	02-042	Sheriff District-2 Tactical
291	02-043	Sheriff District-3 Tactical
292	02-044	Sheriff District-4 Tactical
293	02-045	Sheriff Aviation
295	02-047	Major Crimes Bureau
307	02-063	Criminal Intelligence Bureau
309	02-065	Sheriff Operations Support Bureau
310	02-066	Organized Crime Division
313	02-071	Criminal Investigations Division
314	02-072	Auto Theft (East)
323	02-083	Sheriff Media Affairs
324	02-084	Sheriff Internal Affairs
325	02-085	Crime Prevention
341	02-105	Courthouse Transportation
384	03-000	Disaster (All Call)
385	03-001	Disaster Team 1
386	03-002	Disaster Team 2
387	03-003	Disaster Team 3
388	03-004	Disaster Team 4
389	03-005	Disaster Team 5
390	03-006	Disaster Team 6
391	03-007	Disaster Team 7
392	03-010	Disaster Team 8
393	03-011	Disaster Team 9
394	03-012	Disaster Team 10
395	03-013	Disaster Team 11
396	03-014	Disaster Team 12
397	03-015	Disaster Team 13
398	03-016	Disaster Team 14
399	03-017	Disaster Team (Supervisor)
400	03-020	Special Events (All Call)
401	03-021	Special Events Channel 1
402	03-022	Special Events Channel 2
403	03-023	Special Events Channel 3
404	03-024	Special Events Channel 4
405	03-025	Special Events Channel 5
406	03-026	Special Events Channel 6
407	03-027	Special Events Channel 7
408	03-030	Special Events Channel 8
409	03-031	Special Events Channel 9
410	03-032	Special Events Channel 10
411	03-033	Special Events Channel 11
412	03-034	Special Events Channel 12
413	03-035	Special Events Channel 13
414	03-036	Special Events Channel 14
415	03-037	Special Events Supervisor
434	03-062	Sheriff Marine Unit
435	03-063	Sheriff Canine Unit
478	03-116	Auto Theft (West)
479	03-117	Countywide East
481	03-121	Special Investigations Bureau
483	03-123	Special Investigations Info
512	04-000	Fire and Rescue (Agency Call)
536	04-030	Special Operations Tactical 2
537	04-031	Special Operations Tactical 4
538	04-032	Fire (Crisis)
542	04-036	Fire and Emergency Medical Service (Dispatch)
545	04-041	Fire Tactical 1 (Dispatch)
546	04-042	Fire Tactical 2
547	04-043	Fire Tactical 3 (Patch)
548	04-044	Fire Tactical 4
549	04-045	Fire Tactical 5
550	04-046	Fire Tactical 6
551	04-047	Fire Tactical 7
554	04-052	Fire (Supervisors)
571	04-073	Fire Tactical 15
573	04-075	Fire Tactical 17
581	04-085	Fire/Rescue Administration
593	04-101	Fire Landing Zone
596	04-104	Medical Helicopter Landing Zone
625	04-141	Emergency Medical Service
641	05-001	Fire/Advanced Life Support
692	05-064	Public Safety Hailing
693	05-065	Public Safety Mutual Aid 1
694	05-066	Public Safety Mutual Aid 2
705	05-081	Battalion Chiefs Common
720	05-100	Fire (Medical)
1057	08-041	University of South Florida Police (Dispatch)
1058	08-042	University of South Florida Police 2
1059	08-043	University of South Florida Police 3
2044	15-154	Transport Division
2046	15-156	Fire/EMS (Patch to Dispatch)
2047	15-157	Fire/EMS (Patch to Dispatch)

❖ West Bend, Wisconsin

West Bend is the county seat of Washington County, located half way between Milwaukee and Fond du Lac in southeastern Wisconsin. The town is home to about 28,000 residents and was recognized by *Ripley's Believe It Or Not* as the only city in the United States not to enter the Great Depression on the strength of the local economy.

Over the past thirty years Washington County has grown from just over 80,000 residents to nearly 120,000. To serve the public safety needs of these residents, in March the county approved a $10.3 million contract with M/A-COM to provide a digital radio network that will cover at least 95% of the 436-square-mile county.

The new system will make use of seven existing repeater sites and is scheduled to be in operation by 2009. It will serve the county Sheriff and Highway departments as well as local public safety departments.

The $10.3 million includes repeater site equipment, portable and vehicle-mounted radios, as well as workstations for four dispatch centers. These centers will be located in Germantown, Hartford, and West Bend, along with the Sheriff's Department. Maintenance for the dispatch center equipment will be the responsibility of each municipality.

Until the new system is operational, you can hear the county activity on the following conventional analog frequencies:

Frequency	Description
150.775	West Bend Fire
151.130	County Highway Department
151.235	West Bend Fire (Dispatch)
151.280	MARC
153.935	West Bend Police (Tactical)
154.010	County Fireground
154.190	County Fireground
154.295	FIRECOM
154.740	West Bend Police (Dispatch)
155.250	Sheriff (Dispatch)
155.340	EMS to Hospital (BLS)
155.370	Law Enforcement (Point-To-Point)
155.475	WISPERN Law Enforcement Mutual Aid
155.490	West Bend Police
155.595	Municipal Police Departments
155.880	West Bend Fire (Paging)
156.240	County Highway Department
158.835	County Fire (Paging)
158.910	West Bend Police
159.090	County Jail
159.180	West Bend Public Works
159.240	West Bend Fireground
159.435	Sheriff Vehicle-Mounted Repeaters
159.825	County Fire Dispatch
159.975	West Bend Water Utility
453.250	West Bend Water Department
453.350	Wastewater Treatment Plant
453.800	Building Maintenance
453.850	County Courthouse

That's all for this month. More information, links and frequencies can be found on my web site at **www.signalharbor.com.** I also welcome your questions, comments and activity reports via electronic mail to *dan.veeneman@ monitoringtimes.com*. Until next time, happy scanning!

Big Savings on Radio Scanners

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Bearcat® 796DGV Trunk Tracker IV with free scanner headset
Manufacturers suggested list price $799.95
CEI Special Price $519.95
1,000 Channels • 10 banks • CTCSS/DCS • S Meter
Size: 6¹⁵/₁₆" Wide x 6⁹/₁₆" Deep x 2³/₈" High
Frequency Coverage: 25.000-512.000 MHz., 806.000-956.000 MHz. (excluding the cellular & UHF TV band), 1,240.000-1,300.000 MHz.

When you buy your Bearcat 796DGV Trunktracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC796DGV scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The 1,000 channel Bearcat 796DGV is packed with features to track Motorola Type I/II/IIi Hybrid, EDACS, LTR Analog Trunk Systems and Motorola APCO 25 Phase I digital scanner including 9,600 Baud C4FM and CQPSK. Also features control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control and programming with RS232C 9 pin port (cable not supplied), Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for $29.95. For complete details, download the owners manual from the **www.usascan.com** web site. For fastest delivery, order on-line at www.usascan.com.

Bearcat® BCT8 Trunk Tracker III
Manufacturer suggested list price $299.95
CEI Special Price $169.95
250 Channels • 5 banks • PC Programmable
Size: 7.06" Wide x 6.10" Deep x 2.44" High
Frequency Coverage: 25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 400.0000-512.0000 MHz., 806.0000-823.9950 MHz., 849.0125-868.9950 MHz., 894.0125-956.0000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker **ESP20** with mounting bracket & 10 feet of cable with plug attached $19.95. Magnetic Mount mobile antenna **ANTMMBNC** for $29.95.

SCANNERS

Bearcat® BCD396T Trunk Tracker IV
Suggested list price $799.95/**CEI price $519.95**
APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.
Size: 2.40" Wide x 1.22" Deep x 5.35" High
Frequency Coverage:
25.0000-512.0000 MHz., 764.0000-775.9875 MHz., 794.0000-823.9875 MHz., 849.0125-868.8765 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets

you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning. **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio stations actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** – 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAH Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - A blue LCD light remains on when the back light key is pressed. Autolight - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.

More Radio Products
Save even more on radio scanners when purchased directly from CEI. Price includes delivery in the continental USA excluding Alaska.

Bearcat 898T 500 channel Trunktracker III base/mobile	$209.95
Bearcat 796DGV 1,000 channel Trunktracker III base/mobile	$519.95
Bearcat BCD396T APCO 25 Digital scanner with Fire Tone Out	$519.95
Bearcat 246T up to 2,500 ch. Trunktracker III handheld scanner	$214.95
Bearcat Sportcat 230 alpha display handheld sports scanner	$184.95
Bearcat 278CLT 100 channel AM/FM/SAME WX alert scanner	$129.95
Bearcat 248CLT 50 channel base AM/FM/weather alert scanner	$104.95
Bearcat 92XLT 200 channel handheld scanner	$109.95
Bearcat 72XLT 100 channel handheld scanner	$99.95
Bearcat BR330T up to 2,500 ch. Trunktracker III with Tone out	$274.95
Bearcat BCT8 250 channel information mobile scanner	$169.95
Bearcat 350C 50 channel desktop/mobile scanner	$104.95
AOR AR16BQ Wide Band scanner with quick charger	$199.95
AOR AR3000AB Wide Band base/mobile receiver	$1,079.95
AOR AR5000A+3B Wide Band 10 KHz to 3 GHz receiver	$2,599.95
AOR AR8200 Mark IIIB Wide Band handheld scanner	$594.95
AOR AR8600 Mark II Wide Band receiver	$899.95
AOR AR-ONE Goverment/Export sales only 10 KHz-3 GHz	$4,489.95
Scancat Gold For Windows Software	$99.95
Scancat Gold for Windows Surveillance Edition	$159.95

Bearcat® BC246T Trunk Tracker III
Suggested list price $399.95/**CEI price $214.95**
Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.
Size: 2.72" Wide x 1.26" Deep x 4.6" High
Frequency Coverage:
25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 216.0000-224.9800 MHz., 400.0000-512.0000 MHz., 806.0000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAH nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part **#HF24RS** for $29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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In Time for Boating and Hurricane Season:
USCG Information Schedule

June brings with it the first day of the Atlantic hurricane season. Now that the future of US Coast guard high frequency (HF) has become clear, we can pass along this list of all HF information and weather broadcasts sorted by Coordinated Universal Time (UTC). This pulls together a lot of information buried in various places, and it gets used a lot around here. It's up to date as of April 2008.

HF voice usually uses a new synthesizer named "Iron Mike." Yes, "Perfect Paul" has taken his retirement pension.

FAX is radio facsimile, a frequency-modulated analog picture transmission mode. Tune it in upper sideband (USB), 1.9 kilohertz (kHz) below the listed carrier frequencies. The parameters are 120 lines per minute and 576 for Index of Cooperation. FAX schedules last hours, if not all day, so the times noted here are when a new schedule starts.

SITOR is Simplex Telex Over Radio, mode B. It's a text-based teleprinting mode that many computer programs can decode. The frequencies are assigned channel centers, and your dial reading will vary depending on several factors. Since speed is always 100 baud and shift is always 170 Hertz, the only thing to worry about is normal versus inverted polarity. Just use the one that works.

NMC is Communications Area Master Station, Pacific (CAMSPAC Point Reyes). NMN is Communications Area Master Station, Atlantic (CAMSLANT Chesapeake). NMF is Communications Station, Boston, MA. NMG is New Orleans, LA. NMO and KVM70 are in Hawaii. NRV is Guam, and NOJ is Kodiak, AK. NIK is a special callsign used for ice charts and bulletins sent from Boston.

Most of these frequencies are shared. Exact times may change slightly to accommodate FAX transmissions or tropical warnings on the same frequencies. Interference can occur outside target areas.

Audio samples of these modes are all available at **www.monitoringtimes.com/html/utility_world.html**. SITOR-A (/sitor_a1.mp3), SITOR-A marker (/wlo_sitor_id.mp3), SITOR-B (/sitor_b.mp3), and a brief clip from a weather FAX (/nmc_fax.mp3).

US COAST GUARD HF SCHEDULES

Time	Station	Mode	Frequencies
0000	NMG	FAX	4317.9, 8503.9, 12789.9
0005	NMO	USB	8764, 13089
0015	NMC	SITOR	8416.5, 16806.5
0030	NMF	SITOR	6314, 8416.5, 12579
0100	KVM70	FAX	11090, 16135
0130	NMO	SITOR	8416.5, 12579, 22376
0140	NMC	FAX	4346, 8682, 12786, 17151
0140	NMF	SITOR	6314, 8416.5, 12579
0203	NOJ	USB	6501
0230	NMF	FAX	4235, 6340.5, 9110
0230	NRV	SITOR	12579, 16806.5, 22376
0243	NMF	FAX	4235, 6340.5, 9110
0330	NMN	USB	4426, 6501, 8764
0330	NRV	USB	13089
0400	NOJ	FAX	4298, 8459, 12412.5
0430	NMC	USB	4426, 8764, 13089
0438	NIK	FAX	4235, 6340.5, 9110
0500	NRV	SITOR	12579, 16806.5, 22376
0515	NMN	USB	4426, 6501, 8764
0519	KVM70	FAX	9982.5, 11090
0600	NMG	FAX	4317.9, 8503.9, 12789.9
0600	NMO	USB	6501, 8764
0655	NMC	FAX	4346, 8682, 12786
0730	NMO	SITOR	8416.5, 12579
0745	NMF	FAX	4235, 6340.5, 9110
0900	NRV	SITOR	12579, 16806.5, 22376
0930	NMN	USB	4426, 6501, 8764
0930	NRV	USB	6501
1030	NMC	USB	4426, 8764, 13089
1115	NMN	USB	6501, 8764, 13089
1120	NMC	FAX	4346, 8682, 12786
1124	NMC	FAX	4346, 8682, 12786, 17151.2
1200	NMG	FAX	4317.9, 8503.9, 12789.9, 17146.4
1200	NMO	USB	6501, 8764
1218	NIK	SITOR	8416.5, 12579, 16806.5
1300	KVM70	FAX	9982.5, 11090
1330	NMO	SITOR	8416.5, 12579
1400	NMC	FAX	4346, 8682, 12786, 17151.2
1400	NMF	FAX	6340.5, 9110, 12750
1405	NMF	FAX	6340.5, 9110, 12750
1500	NRV	SITOR	12579, 16806.5, 22376
1530	NMN	USB	6501, 8764, 13089
1530	NRV	USB	6501
1600	NIK	FAX	6340.5, 9110
1630	NMF	SITOR	8416.5, 12579, 16806.5
1630	NMC	USB	8764, 13089, 17314
1645	NOJ	USB	6501
1715	NMN	USB	8764, 13089, 17314
1719	KVM70	FAX	11090, 16135
1720	NMF	FAX	6340.5, 9110
1730	NMC	SITOR	8416.5, 16806.5
1800	NMG	FAX	4317.9, 8503.9, 12789.9, 17146.4
1800	NMO	USB	8764, 13089
1810	NIK	FAX	6340.5, 9110
1840	NMC	FAX	8682, 12786, 17151.2, 22527
1900	NMF	FAX	6340.5, 9110
1900	NRV	SITOR	12579, 16806.5, 22376
2025	NMG	FAX	4317.9, 8503.9, 12789.9, 17146.4
2030	NMO	SITOR	8416.5, 12579, 22376
2130	NMN	USB	6501, 8764, 13089
2130	NRV	USB	13089
2150	NOJ	FAX	4298, 8459, 12412.5
2230	NMC	USB	8764, 13089, 17314
2315	NMN	USB	6501, 8764, 13089
2315	NRV	SITOR	12579, 16806.5, 22376
2320	NMC	FAX	8682, 12786, 17151.2, 22527
2324	NMC	FAX	8682, 12786, 17151.2, 22527

❖ Goodbye USCG Telex

Last month, we noted that the US Coast Guard did not have funding to replace all of its HF transmitters, and the on-call radio telex service would probably have to go. Sure enough, only a few days elapsed before USCG sent out a terse announcement of its imminent demise at NMN (CAMSLANT) and NMC (CAMSPAC). In fact, it will be gone by the time anyone sees this column.

The service affected here is the HF on-call radio telex in SITOR mode A, using paired frequencies in the 6, 8, 12, 16, and 22 megahertz maritime bands. SITOR-A modulation is somewhat like SITOR-B, but with interactive error checking. Messages are sent in short bursts, with time in between for the receiving station to do a quick calculation and ask for a repeat if necessary. This makes the distinctive chirp-chirp sound you might have heard.

Not that long ago, the teleprinting sub-bands were an incredible cacophony of screeching markers, Morse code identifiers, and chirp-chirp traffic exchanges from around the world. But in the 1990s, most users migrated to the largely space-based Global Maritime Distress and Safety System (GMDSS). Stations dropped away one by one, leaving large silent gaps in the bands.

In the US, the only remaining daily commercial SITOR provider is the Shipcom station WLO, in Alabama. For those who want to catch something in this mode, a list of WLO frequencies is provided

The Coast Guard has always been limited by international treaties to non-commercial traffic. This consists mostly of formatted position updates for the Automated Mutual-Assistance Vessel Rescue service (AMVER), plus coded high seas weather observations (OBS). Most of these are now passed over the GMDSS, which is compulsory on the large merchant vessels participating in the programs.

At press time, NMN (CAMSLANT) and NMC (CAMSPAC) are both silent. The maritime bands just became a lot quieter – again.

WLO RADIO TELEX

Channels are allocated by the International Telecommunications Union. Frequencies shown are assigned channel centers in kHz.

Channel	Ship Transmit	Shore Transmit
406	4175.0	4213.0
606	6265.5	6317.0
806	8379.0	8419.0
810	8381.0	8421.0
815	8383.5	8423.5
1205	12479.0	12581.5
1211	12482.0	12584.5
1605	16685.5	16809.0
1615	16690.5	16814.0
1810	18875.0	19685.5
2215	22291.5	22383.5
2510	25177.5	26105.5

WLO SIMPLEX RADIO E-MAIL

Mostly Packet Teleprinting Over Radio (Pactor-II), but SITOR is allowed. These are also assigned channel centers in kHz:

6416.0 8473.0 12886.5 13051.5 16997.5 22688.0

❖ Hello eLoran

Along with Coast Guard HF, the future of the US Long Range Navigation (Loran) system was opened up for public comment last year. It, too, found support. On February 7, the Department of Homeland Security (DHS) announced that the chattery pulsed Loran-C transmissions will continue on 100 kHz. An audio sample of these is at (**www.monitoringtimes.com/html/utility_world. html/loran.mp3**).

The plan is to upgrade the existing Loran-C network into "an independent national positioning, navigation and timing system that complements the Global Positioning System (GPS) in the event of an outage or disruption in service."

The release continues: "The enhanced Loran, or eLoran, system will be a land-based, independent system and will mitigate any safety, security, or economic effects of a GPS outage or disruption."

It becomes obvious that what ultimately saved Loran was a combination of new digital technology and common sense. For years now, most alternatives to GPS (and Glonass, its Russian counterpart) have been disappearing. It does appear as if the world's overall transportation safety, and a good deal of its daily functioning, have come to depend on a single, space-based, highly vulnerable system originally designed for US military use. In the real world, where things go wrong, it's nice to have redundancy.

However, it's not completely correct to regard eLoran as a simple back-up to GPS. Its awesomely high transmitter powers, its low frequency, and the generally reliable ground wave propagation mean that it can provide meaningful time of day and position information in places where GPS receivers lose their view of the sky. It's not hard to envision a combined navigation receiver using the best features of both modes. Additional messages transmitted by digital modulation of an extra pulse added to eLoran can contain data that improves the accuracy of both.

Tests of the eLoran mode have already been made. It sounds the same, but analysis on a triggered scope synchronized to the Group Repetition Interval of the particular chain being received reveals the new ninth pulse after the standard eight per repetition. This new pulse is modulated to allow various types of digital data to be sent.

While it has always been intended as a navigation system for ships at sea, a previous, unsuccessful attempt to create a system suitable for precision aircraft approaches left Loran-C with greatly improved land coverage. In fact, the existing network already covers the entire continental US.

Something similar is happening in the UK. An eLoran system is being installed at the VT Communications site in Anthorn. Full operation is expected in 2010, and it is intended to last until at least 2022.

❖ New US Military Radio Contract

For going on ten years now, the US military has been very interested in developing an "interoperable" radio system. The idea was to use flexible, software-based radios for everything. They would be loaded with the particular "waveforms" (modes) and frequencies (DC to daylight) needed for a mission. The result would be one standard radio system used by the entire military.

In defense industry specs and documents, this is called the JTRS, for Joint Tactical Radio System. Most people involved with the project call it the "Jitters." This is certainly what the incredible scope of the project has been giving a lot of them.

In 2005, JTRS was largely pronounced dead. It was becoming harder than previously thought to nullify the laws of physics by throwing digital technology at them. Transmitting antennas still insisted on being a tuned length, waves still propagated at the same speed, and some technologies continued to work better in one frequency range than another.

After some rethinking, the JTRS project continued. In fact, as we go to press, Lockheed Martin has just beaten out Boeing for a 775 million dollar contract to begin a new radio system to link "ships, aircraft, and ground stations" of all services. This is called AMF JTRS (AMF standing for Airborne and Maritime/ Fixed station).

The company's publicity materials describe a system which will essentially implement a wide-area digital network over the radio. Whatever goes into it will be turned into a standard, military-spec, digital modulation. Receivers used by all the participating units will have the capability to turn the resulting data stream back into the appropriate sounds, pictures, text, or whatever else has been devised by the fertile (and well-funded) brains of defense contractors.

This particular concept is not as revolutionary as it sounds. Most of the new generation of military equipment already uses software derived radios (SDR) and digital modes that turn everything into data.

On one level, it's actually rather close to the technology I'm using to write and submit this column: I read my e-mail about things, listen to them on my digital signal processing radio, decode them with computer software, write about them with different software, and finally shoot it all off to Brasstown via the Internet. The future of utility radio, like most other communications, is looking pretty digital.

U TILITY WORLD

UTILITY LOGS

Hugh Stegman

ABBREVIATIONS USED IN THIS COLUMN

AFB................. Air Force Base
ALE .... Automatic Link Establishment
AM .... Amplitude Modulation
CAMSLANT ..... Communication Area Master Station, Atlantic
CW .... On-off keyed "Continuous Wave" Morse telegraphy
E06................. Russian Intelligence, machine voice in English
EAM............... Emergency Action Message
FAX................. Radiofacsimile
HFDL .... High-Frequency Data Link
HF-GCS .... High-Frequency Global Communication System
MARS............. Military Affiliate Radio System
NASA............. US National Aeronautics and Space Administration
PR.................. Puerto Rico
RTTY .... Radio Teletype
Selcal............. Selective Calling
SK01.............. Generic for Cuban numbers in ham digital modes
UK .... United Kingdom
US .... United States
USAF .... US Air Force
USCG .... United States Coast Guard
V02a.............. "Atencion" Spanish numbers, 3-msg format
Volmet .... "Flying Weather," formatted airport observations

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ( ).

2872.0   Gander-Gander Radio oceanic air control, NFD, position and selcal with British Airways Speedbird 445, at 0247. (Allan Stern-FL)
2899.0   Shanwick-UK oceanic air control, working an aircraft enroute to Prestwick, at 0146. (Stern-FL)
3016.0   Santa Maria-Atlantic oceanic air control, Azores, working Delta 100 at 0138. (Stern-FL)
3287.0   CKN-Canadian Forces, Vancouver, BC, RTTY marker at 0715. (Tom Sevart-KS)
3455.0   Gander, position from Westjet 595, at 0119. (Doug Bell-Canada)
3485.0   New York-US Federal Aviation Agency, NY, Volmet aviation weather at 0235. (Jeff Seale-KY)
4235.0   NMF-USCG, Boston, MA, FAX weather charts at 0434. (Sevart-KS)
4271.0   CFH-Canadian Forces weather center, Halifax, NS, coded RTTY weather observations at 0435. (Sevart-KS)
4477.0   003CAP-US Civil Air Patrol, working AVS032608 in ALE, at 0610. (Sevart-KS)
5186.0   "The English Man"-Russian AM numbers (E06), callup 891 682/22 and 5-figure groups, at 2030. (Mike L-West Sussex, UK)
5520.0   New York, sending unheard aircraft to 5598 for Shanwick, at 0307. (Stern-FL)
5550.0   Iberia 6122, position for New York, at 0027. (Bell-Canada)
5598.0   New York, selcal check with unknown aircraft at 0136. (Stern-FL)
5616.0   Gander, sending unknown aircraft to 3016 for Shanwick, at 0256. (Stern-FL)
5696.0   Coast Guard 2135-USCG helicopter, sending target positions to Sector Corpus Christi, TX, at 0025. (Mark Cleary-SC) CAMSLANT Chesapeake-USCG, VA, taking ops-normal from HC-130 Coast Guard 1501, at 1437. (Mdmonitor-MD)
5732.0   TSC-US Customs Service Center, FL, raising J01 in ALE, then voice as Service Center patching helicopter Juliet 01 to E-City Air (USCG, Elizabeth City, NC), regarding a possible exercise in Baltimore, at 2351. (Cleary-SC)
6312.0   NMN-USCG CAMSLANT, VA, with formatted SITOR-B maritime bulletin announcing that on-call radiotelex there and at NMC, CA would cease March 31, at 0210. (Seale-KY)
6532.0   AP918E-Constructor's test flight number of new Airbus A330, going to Quatar Airways as A7-AEO, with HFDL position at 1314. (Patrice Privat-France)
6586.0   New York, sending American 1742 to 3455.0, at 0156. (Stern-FL)
6604.0   New York Volmet, US aviation weather at 0238. (Stern-FL)
6628.0   New York, sending Lufthansa 535 to 2962 for Santa Maria, at 0302. (Stern-FL)

6640.0   New York, working unknown aircraft at 0254. (Stern-FL)
6695.3   "5-T-P"-Probable US Navy, calling "1-I-M," no joy at 2122. (Mdmonitor-MD)
6695.4   Golf-US Navy tactical link coordination net, working Lima and Sierra, at 2227. (Mdmonitor-MD)
6754.0   Trenton Military-Canadian Forces Volmet, aviation weather at 2312. (Mdmonitor-MD)
6897.0   BRD-NASA Booster Recovery Director, FL, working Booster Recovery Vessel *Freedom Star* on a space shuttle mission, at 0425. (Stern-FL)
6985.0   23417TFBLACK-Unknown US military, working DECOPS, ALE at 1527. (Jack Metcalfe-KY)
7527.0   J32-USCG helicopter Coast Guard 6032, ALE sounding at 2049. (Mdmonitor-MD)
7650.0   BDETOC-US military, working BDETAC and 3435, ALE at 1630. (Metcalfe-KY)
8180.0   Cuban RDFT file transfer mode (SK01), repeating file 76857865.txt for at least two hours, at 0755. (Sevart-KS)
8843.0   San Francisco-North Pacific air route control, CA, position from US Customs Omaha 73, at 0327. (Bell-Canada) San Francisco, taking position from unknown Hawaiian Airlines flight, at 0409. (Stern-FL)
8864.0   Gander, position from Reach 2366, at 1353. (Bell-Canada) Gander, relaying position message from USAF Reach 971 to Hilda (Air Mobility Command control, IL), at 2129. (Mdmonitor-MD)
8906.0   New York, air traffic control with USAF Reach 351, at 2106. (Mdmonitor-MD)
8912.0   LNT-USCG, VA, ALE with J14, then voice as CAMSLANT taking ops-normal from helicopter Juliet 14, at 2328. (Mdmonitor-MD)
8918.0   Victory 7-Unknown aircraft, working New York at 1522. (Bell-Canada) *[Doesn't sound military - Victory Air Transport charter? -Hugh]*
8971.0   Fiddle-US Navy, FL, radio check with P-3C Pelican 711, at 1412. (Mdmonitor-MD)
8983.0   Coast Guard 2121-USCG helicopter, declaring an in-flight emergency for a mechanical problem, at 1659. (Cleary-SC)
10242.0   LNT-USCG CAMSLANT, working 500 in ALE, then voice as CAMSLANT Chesapeake, taking ops-normal from Coast Guard 1500, at 2045. (Mdmonitor-MD)
10945.0   CFH-Canadian Forces, NS, RTTY marker at 2037. (Sevart-KS)
11175.0   Puerto Rico-USAF HF-GCS, Salinas, PR, patching Ascot 7064, a UK Royal Air Force E-3, to a US weather office, at 1152. (Stern-FL)
11181.0   Lajes-USAF, Azores, ALE and data at 1431. (Bell-Canada)
11232.0   Trenton Military-Canadian Forces, ONT, relaying an arrival message to Wing Ops from Canforce 2601, then patch to Palomino Ops (USAF, SC), at 2103. (Mdmonitor-MD)
11330.0   Air Canada 186, asking New York for a higher altitude, at 1558. (Bell-Canada)
11387.0   Sydney Volmet, aviation weather for Australian airports at 1030. (Stern-FL)
11439.5   BDETAC-US military, working 3435, ALE at 1549. (Metcalfe-KY)
11494.0   500-USCG Coast Guard 1500, ALE sounding at 1708. (Mdmonitor-MD)
11630.0   T1Z244-US Army or National Guard, ALE sounding, also on 12129, at 1940. (Metcalfe-KY)
13089.0   NMN-USCG, voice synthesized weather at 2140. (Sevart-KS)
13907.0   Coast Guard Rescue 1720-USCG HC-130H, ALE-initiated patch through Service Center (US Customs, FL), to Coast Guard Sector Key West regarding a search and rescue operation, at 2003. (Mdmonitor-MD)
13927.0   AFA4DD-USAF MARS, patching Teal 25, Air Force Reserve 53rd Weather Recon WC-130, to Teal Ops, Keesler AFB, MS, at 1911. (Stern-FL)
15016.0   Andrews-USAF HF-GCS control point, Andrews AFB, MD, with two short 6-character EAMs for Milk Wagon, Oxbow, Cotton Rose, Example, Speedway, and Kazoo, at 1652 and 1724. (Haverlah-TX)
15867.0   Coast Guard 1701-USCG HC-130H, ALE and voice with unheard aircraft on a search and rescue, at 1629. (Mdmonitor-MD)
17435.0   Cuban RDFT file transfer mode (SK01), tuneup signals from apparent multiple transmitters, then passed binary files at 1605, 1615, and 1625. Cuban AM V02a, repeated "tres" test starting at 1657, messages cut abruptly before carrier drop at 1759. (Ben Jones-MS)
17515.0   Cuban Spanish AM numbers (V02a), 5-figure message in progress at 1619. (Sevart-KS)

DIGITAL DIGEST

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Mixed Bag

This month we update you on a few ALE networks, the very useful ITU Monitoring Service, and show how you can help with some valuable research into HF radio propagation.

❖ Mexican Oil and Gas Network Update

Jon in Florida, a frequent visitor of the utility DXers channel on IRC, did some further digging on the ALE network operated by the Mexican state oil company PEMEX. Here's the complete frequency list with Jon's recent additions (kHz USB):

    2165.0, 2182.0, 2260.0, 3700.0, 4078.8,
    4487.5, 7450.0, 8242.9, 8291.1, 9265.0,
    11095.0

As previously noted, no traffic other than ALE has been reported in this network. The identifiers, corresponding to terminals, oil platforms, compressor stations and accommodation platforms in the Gulf of Campeche, are:

AKALJ1, AKALJ2, AKALL1, AKALN1, AKALN2, ATASTA1, ATASTA2, CARMEN, EXEST1, EXEST2, REBOM1, and REBOM2

❖ New Pakistani Navy Frequency

In last month's column, we featured the PacTOR-II traffic sent by the Pakistani Navy. Coincidentally, a few days after writing the column, another frequency of 8283.7 kHz was heard. A ship was sending email to the HQ in Karachi using callsign ARL4.

❖ Center of Data or USB?

Longtime readers will be aware that the majority of frequencies quoted in this column are center of data, usually using a +1500Hz offset.

However, ALE and related high speed modem traffic is often easier to quote in terms of their dial or carrier frequency (USB or LSB). What's the reason? Which is right?

To answer the first question, the reason is that it's inconvenient to quote a center of data frequency in the case of many modern signals that are multi-tone. Imagine searching for the mid point between tones 18 and 19 that would be center of a 39 tone MIL-188-110A App B modem, for example. It's much easier to quote the USB frequency, which in many cases is a whole kilohertz point. With simple RTTY (2 tone signals) it's easier to quote the center of

data frequency, just because it's easier to find!

In the second case, both are right. For example, a MIL-188-141A ALE signal consists of 8 tones each spaced 250Hz, so that the mid-point of the signal is at 1625Hz above the carrier point. So an ALE signal on 12200 kHz USB is equivalent to a center of data of frequency 12201.625kHz.

If you see frequencies in the column noted as 12123 kHz (USB) we mean USB dial frequency. If it's just 6774.8 kHz, that means center of data with a +1500Hz offset (or 6773.5 USB).

❖ ITU Monitoring Service

Just a quick reminder about this excellent service available for free on the web (see Resources). Charged with identifying and ridding the airwaves of intruders on protected frequencies, the ITU MS provides a quarterly updated listing of offenders which can be downloaded in a variety of formats. At present, both PDF documents and DBF database files are offered.

Each report contains a few thousand frequencies, regularly scanned by the Service in the broadcast, amateur radio, maritime and aeronautical bands. Most interestingly, many of the stations are identified through direction-finding, and direction and location are often provided in the reports. Some very interesting reading indeed.

❖ Want to Help with Propagation Research?

If you've been keeping up with the radio news, you'll probably know that we're (hopefully) about to start experiencing an upturn in radio propagation as the next Solar Cycle begins to take off. A few years ago, amateur radio societies from several countries lobbied to get access to a few channels of spectrum around 5 MHz, an interesting place between the 80m and 40m ham bands. One of the primary reasons was to investigate the use of these frequencies for NVIS (Near Vertical Incidence Signals), a type of propagation which does well at 5 MHz.

The UK amateur radio society (RSGB) instituted a more technical program to study these new channels and established three automated beacons (see Resources), each operating on a

time-shared basis on 5.290 MHz: GB3RAL at the world famous Rutherford Appleton Laboratories in Oxfordshire, GB3WES in Cumbria, and GB3ORK on the Scottish island of Orkney.

Every 15 minutes, each of these beacons transmits a specially designed set of signals that step down in power and ends in a pulsed sequence that allows specialized measurements to be made.

Even better, you can participate in the research. If you have a sound card-equipped Windows PC, you can download some special software (see Resources) to monitor the beacons. The software, designed by Peter Martinez (father of digital signals AMTOR and PSK31), implements a very sharp digital filter to detect and measure the beacon signals as well as keeping a precise track of time.

Aside from showing you reception in real-time, the program also logs its data to disk which can be submitted to the RSGB project team for further analysis.

❖ Digital Bandscan

This week we go a little higher in frequency and check 14350 to 15000 kHz for recent utility signals.

That's it for this month. Thanks for the letters and email and enjoy your digital listening.

DIGITAL BANDSCAN: 14350 - 15000 KHZ

Freq kHz	ID	User	Signal Type
14376.2	???	NATO Mil	600bd/L STANAG4285 HF modem
14411.0	RDL	Russian Navy	CW, broadcast
14415.7	IGJ	Italian Navy	600bd/L STANAG4285 HF modem
14420.0	GIRBA	UN, Sudan	MIL-188-141A ALE
14436.3	???	French Navy	50bd/850 FSK UNID crypto system
14445.0	043MERCAP	Civil Air Patrol	MIL-188-141A ALE
14520.0	???	UK Mil	1200bd/L STANAG4285 modem
14541.7	ZADDIA10	Czech Diplo	100bd/200 PacTOR selcal
14616.7	???	Egyptian Diplo	100bd/170 SITOR-A
14620.0	11108	Egyptian Diplo	Codan 9001 16 tone modem
14626.7	???	Egyptian Diplo	100bd/170 SITOR-A
14633.0	???	German Mil	2400bd MHARS modem
14666.0	???	GlobeWireless	100bd/200 Globedata modem
14683.0	99910	Egyptian Diplo	Codan 9001 16 tone modem
14728.0	ZSC	GlobeWireless	100bd/200 Globedata modem
14740.0	PR0xx	US Mil?	MIL-188-141A ALE
14896.0	???	Russian Mil	75bd/200 FSK UNID crypto system
14928.5	82KNY	US SHARES	MIL-188-141A ALE

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Implications of Chinese Jamming

China is all over the SW bands, not only with legitimate domestic and external broadcasts (on far more frequencies than really necessary, thus causing interference problems for countless fellow broadcasters), but also jamming just about everything from abroad in Chinese and minority languages, except for some religious broadcasts considered to be inconsequential. Where did they get all those transmitters, used for goodwill and ill?

As in all other areas, the Chinese Communists have no respect for patents or copyright, and are adept at copying anything invented or manufactured abroad.

A contributor who requires anonymity says, one SW transmitter manufacturer in recent times (perhaps early this decade) sold to China "two" high powered SW transmitters. Since then, China has copied those transmitters to the point where China has produced and put into service *more* of them than the original SW transmitter manufacturer has ever sold/manufactured worldwide (to date).

To grasp the enormity of the situation, the number of such Chinese-copied SW transmitters is somewhere in a range above 200, probably closer to 500!

Coincidentally, Olle Alm in Sweden monitored no less than 27 Firedrake jamming frequencies at once, 1230 UT: 7280, 7470, 9575, 9680, 9780, 9845, 11590, 11605, 11665, 11710, 11775, 11785, 11805, 11825, 11840 12040, 13830, 13970, 14410, 15255, 15280, 15375, 15465, 15795, 17565 (alt. 17560), 17705. How's that for an Olympic record?

And Olle says he has seen copies of the instruction manual for a SW transmitter made in China which says it "is designed on the basis of the SW150A high power broadcasting transmitter, referring to the Type 420C shortwave broadcasting transmitter made by US Continental Co."

So, it's no secret where the original came from. 420C is the 500 kW model installed by Continental in Xinjiang and Yunnan (five each).

At least the Xinjiang units appear to have feeders leading to additional antennas beaming east and south (Lhasa) for transmissions that will never appear in the HFCC schedules.

French defense electronics firm Thalès, under attack by human rights groups for selling jamming equipment to China, now used especially to block broadcasts to Tibet, said it only sold standard SWBC equipment in 2002, but it was for legal civil purposes, not "jamming kits," Reuters reported (via Alokesh Gupta).

Kits? What kits? It's easy to turn a legit SWBC transmitter into a jammer, especially if you're just playing music over it rather than grinding noises or bubbles! The implication is, you should not sell any legit SWBC transmitters or antennas to a country known to or likely to jam and to enjoy egregious human rights violations. Sounds a lot like arms merchants justifying their business, no?

Kai Ludwig explains: They sold standard ALLISS units. It appears that the whole Firedrake thing is fully integrated into China's shortwave broadcast transmitter operations, since it is technically just another program audio circuit, as explained at **www.satdirectory.com/firedrake.html**

It should be also noted that there does not appear to be an organizational separation between program production (China Radio International and all the domestic services) and transmitter operation. In China both are in the responsibility of the State Administration for Radio, Film and Television. This means also that RCI, RFI, REE and VOR coöperate with an organization that is involved in large-scale, systematic radio jamming.

Kim Elliott adds: I'm sure China uses its brand new imported shortwave transmitters for actual broadcasting by China Radio International, etc. The new transmitters free up older domestic transmitters, the poor audio quality and frequency instability of which are actually beneficial for jamming. (See more below under CHINA; TIBET)

ALGERIA [non] New relays of Qur'an service from here via Sines, PORTUGAL: 0400-0600 and 2100-2300 on 7150, 2000-2100 on 9765. Also one second ahead via Skelton, UK: 0400-0600 7260, 2000-2100 11810, 2100-2300 9710 (Wolfgang Büschel, wwdxc *BC-DX TopNews*) 7150 from *2100, ID as *"Huna Al-Djazair"*, religious songs \\ 9710 (Anker Petersen, Denmark, *ibid.*)

ANTARCTICA Radio Nacional Arcángel, LRA36, back on 15476, with nice Spanish songs and full ID, April 14 at 2026. I'm happy to copy this station again; it's one of my favorites!! Signals are good (Maurits Van Driessche, Belgium, *WORLD OF RADIO*) Had been off since at least January 1; listen M-F at 1900-2100 (gh)

ARGENTINA R. Nacional heard on new 5835 with ballgame, then lottery coverage, probably as feeder to Antarctica, UT Sat 0056. Also heard next weekend UT Sun 0102, but the week after that, UT Sun at 0050 with tango music it was on 5840 (Rubens Ferraz Pedroso, Paraná, *dxclube pr* and *radioescutas* yg)

RAE has a new interim director, Lic. Susana Cuestas, replacing Marcela Campos. She is expected to make some changes in programming (Eduardo Peñaililllo, Chile, *DX LISTENING DIGEST*) So far, the old schedule remains in effect, but in mid-March started webcasting via **www.radionacional.gov.ar/rae/rae.asp** (Gabriel Iván Barrera, via Arnaldo Slaen, *WORLD OF RADIO*) So now we can more reliably than on 15345 and 11710 hear the English hours M-F at 1800 and Tue-Sat 0200 (gh)

BELARUS Radio Minsk A08, daily in English: 2000-2200 on 7390, 7360, 7105 (Via Larisa Suárez, Radio Minsk, via Alokesh Gupta, *DXLD*)

BRAZIL I heard a station with Portuguese talks on 15325.020 Sunday at 1930. Yahoo group in Brazil says Rádio Gazeta were on the air, only 1 kW (Maurits Van Driessche, Belgium, *DXLD*)

CANADA [and non] RCI A-08 in English from Sackville site: 1505-1705 9515; 1800-1859 17735; 2000-2059 15235, 17735; 2305-0005 [Tue-Sat -0105] 6100.

In exchange for relaying TURKEY

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; sesqui = one and a half; A-08=spring/summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

[q.v.] from Sackville, a surprise new relay of RCI English at 0100-0159 via Emirler, Turkey site on 9620, 105 degrees, originally 500 kW, then reduced to 250 (gh)

CHINA [and non] Strong Firedrake jamming heard on new 5330 at 0925-0947 (Lúcio Otávio Bobrówiec, Brasil, *DXLD*) Whenever this happens, one suspects Sound of Hope has appeared on yet another new frequency, but Chinese jammers are quick to pounce (gh) I can receive SOH and Firedrake on 5330 at 1620, strongly. First reception of SOH under 6 MHz (S. Hasegawa, Japan, NDXC-HQ)

China Huayi Broadcasting Co., QSY from 6185 to 4830 on March 20. Now at 2230-0100 and 1200-1700 4830; 0100-1200 6185.

CHBC live streaming: **mms://218.5.3.181:1250/** (S. Hasegawa, NDXC-HQ) And then widely reported in NAm during the 1200-1300 hour by (Mark Schiefelbein, MO, Dan Sheedy and Ron Howard, CA, *DXLD* and Jim Evans, TN, *Cumbre DX*) E- and P-QSLs were forthcoming. See **http://snipurl.com/24wh5**

7285 at 2100 via Albania, which English program from China is this? (Mikhail Timofeyev, Russia, *HCDX*) China Drive from CRI Easy FM, **http://english.cri.cn/ce_easyfm/program-chinadrive.htm** (Mauno Ritola, Finland, *ibid.*) Yes, relaying Easy FM at 2100-2200 on 7285 and 5960 instead of regular CRI external service (Dave Kenny, England, BDXC-UK) After CRI news, at 2105 switches to *China Drive* program (Brian Alexander, PA, *DXLD*) So drivetime in Beijing starts at 5 am? Glad I don't commute there (gh)

COLOMBIA 5600 harmonic, 4 x 1400 from La Voz del Níquel, Montelíbano, 1128-1150 with news from Caracol Básica network, but local ads and IDs (Rafael Rodríguez R., Bogotá, *condiglist* yg)

COSTA RICA The ELCOR transmitter test on 5954.11v at 2230-2330 vanished in late March and not heard since as of mid-April (Terry Krueger, FL; Raúl Saavedra, Costa Rica, *DXLD*, and gh) Found April 18 at 2145, so an hour earlier now (Saavedra, *ibid.*)

CUBA [and non] In 2003 I visited the RHC studios, and a white guy was introduced to me as "Langs-

ton Wright." I spoke with him for five minutes, yet knew that "Langston Wright" was actually an African-American, nor was this Michael Finey (the now-late fugitive from U.S. justice) either. The man I met was probably "Simon Wollers." Everything was very deceptive (Jan Douglas Tuckley, *DXLD*)

It's bad enough, if understandable, that R. Martí is jammed, but Cuba also attacks Voice of America, which would be directly equivalent to the USA jamming its external service, Radio Habana Cuba. Maybe we should, just as payback, with whatever spare transmitters be available. At 0120 during harmless instrumental music show, all three VOA Spanish frequencies from Greenville were jammed, 5890, 6110 and 9885, with 6110 the worst hit (gh)

Once RHC is using a frequency at one time, watch out for it to appear at other times without notice. 12000 was originally 1100-1500 in Spanish, but then was heard sporadically colliding with HCJB in the 2100-0100 period, and also later in English at 0540. It was too strong at times to be an unintentional harmonic from 6000. Just about every day we hear anomalies from Cuban transmitters – wrong language, wrong time, wrong frequency, bad modulation, spurs, etc. (gh)

In mid-March after DST shift in Cuba, looked for R. Rebelde's mid-day transmission on 5 SW frequencies from 11 to 17 MHz, but no sign of it between 1600 and 1830 (gh) Radio Rebelde is now only operating on 5025 with 50 kW and its tropical band high takeoff angle main lobe antenna. The daily morning and midday transmissions are no longer on the air (Arnie Coro, CO2KK, RHC *DXers Unlimited*) see USA

CYPRUS New 5930, Cyprus BC Corp, *2215-2244*, ex-6180. Greek music, radio-drama. Good signal // 7210-poor, mixing with China and // 9760-very weak (Brian Alexander, PA, *DXLD*) 9760 best here (Harold Sellers, Ont., *ibid.*) Fri-Sat-Sun only

ECUADOR HCJB's Brazilian tribal language service in Kulina has expanded to 15 minutes from 2245 daily on 11920. The only thing I could understand was "Matéu, Capítulo Dezoito," so the preacher was referring to Matthew XVIII, the chapter telling people to cut off their hands and feet and gouge out one of their eyes. What good work HCJB is doing. Hmm, must cut feet first, hands last! (gh)

3220, HCJB, Pifo each morning at 1000 to 1020 with incredible signal strength, same as local FM (Robert Wilkner, FL, *DXLD*) Same here, a great signal in Quichua and nice 1100 ID (Mark Taylor, WI, NASWA yg) Scheduled 0830-1300 beaming straight up like // 6080, 10 kW each. Something must be very wrong with their NVIS antenna, supposed to minimize long-distance low-angle radiation! (gh)

EGYPT R. Cairo A-08 English: As 1215-1330 17835; Af 1600-1800 12170; W&CAf 1900-2030 9300; Eu 2115-2245 11550; ENAm 2300-2430 9280, NAm 0200-0330 7270 (via Gordon Brown, *BC-DX*, updated by gh) 11550.1v, on the air from 1500 in other European languages, collides with WEWN which is on 11550 even longer hours; Cairo actually on top here, but bad het (gh, OK)

At least nine of R. Cairo's current frequencies are on or near spy numbers channels as listed by ENIGMA. Can this be coincidental? 6250, 6290, 6860, 9250, 9380, 9960, 12170, 13580, 15040 (José Miguel Romero, Spain, *DXLD*)

EQUATORIAL GUINEA R. Africa reappeared on 15190. It had been missing for many months. This service broadcasts various North American preachers in English, brokered by Pan American Broadcasting in California, first heard at 2059 April 11. Breaks between programs are at odd times and usually with no station ID. Modulation quality varies widely, seemingly depending on the source of the program. (gh)

The first day, a full R. Africa ID and contact info appeared at 2127-2130, but never mentioned Equatorial Guinea; instead, an address in Ghana, where the casual listener would assume this was coming from. Continued past 2200, colliding with WYFR. R. Africa programming went on until about 2230, but carrier stayed on much longer. Quite a good signal here, though supposedly aimed 164 degrees from Bata toward South Africa; perhaps some antenna changes were made during its long absence. 15190 remained on the air for seven days, and was widely monitored, then disappeared, perhaps for a few more years (Glenn Hauser, OK, DXLD)

As early as 1715 (Jerry Lenamon, TX, *DXLD*) The other Bata transmitter on 5005 had just been reactivated the previous morning, 0517-0600+, and also 2200-2300*; last heard the previous December (Brian Alexander, PA, *ibid.*) Only WYFR in Portuguese heard here on 15190 at 2207 (Rudolf Grimm, SP, Brasil, @tividade DX)

QSLs can be requested here: www.radiopanam.com/qslreports.htm (Ron Howard, CA, *DXLD*)

ERITREA V. of Broad Masses, from 0356 with IS on 5955 // 7180, ex-7100 to jam something? Blocked by RFE at 0400 (Martien Groot, Netherlands, *WORLD OF RADIO*)

ETHIOPIA Ethiopian News Agency reported 25 March that R. Oromiya had just been launched from Adama City; DXers had been hearing it for a few months on 6030. *WRTH* says schedule is 0400-0700, 1555-2100 (Chris Greenway, UK, *DXLD*)

[non] Only RMI clandestine via another site is now Voice of Oromia Independence, Saturdays 1700-1730 on 15650 via Germany (Jeff White, RMI, *DXLD*) Jülich, but transmitter fell off at 1720 (Anker Petersen, Denmark, via Dario Monferini, playdx yg)

FRANCE Radio France International A-08 in English including changes effective May-Sept:

0400-0430	9805 11995 EAf
0500-0530	13680 15160 EAf
0600-0630	15160 17800 EAf
	11725 C&WAf
0700-0730	13675 C&WAf
1200-1230	17800 EAf
1600-1700	15605 C&WAf
	17605 EAf

(via Bernie O'Shea, *DXLD*)

GERMANY EAST I have started a tribute site for Radio Berlin International at http://radioberlininternational.blog.co.uk The site pulls together much information about RBI, and people connected to it and invites reminiscences of former listeners and staff. Also included is the entire last English language broadcast on October 2nd, 1990 (Richard Bos, *DXLD*)

GREECE Sundays only English program *Greek in Style* at 0905-1000 on VOG, 9420 and 15605 (Mike Barraclough, England, World DX Club *Contact*) Also Sunday 2305-2401 on 7475, 9420, traditional Greek songs introduced in English by Adrianna (John Babbis, MD, *DXLD*)

INDIA AIR GOS in English, 2130-2215 fair on 9445, very good on 11620, no longer blocked by Portugal which was on 11620 all winter (Roger Chambers, NY, *DXLD*) Other frequencies at 2045-2230 are 7410, 9550, 9910, 11715. 11620 also in use at 1745-1945 and 2245-0045 (AIR via José Miguel Romero, *ibid.*)

IRAN VOIRI in English: 1030-1130 15600 17660; 1530-1630 7375 9600 9635; 1930-2030 6205 7205 9800 9925; 0130 "Voice of Justice" to NAm, 7235 9495 (via Swopan Chakroborty, India, *DXLD*, updated by gh)

Add Lithuanian relay at 1930-2027, confirmed on 7260 (Wolfgang Büschel, *ibid.*) What kind of delay is there between Iran sites and Lithuania? (gh) 7260 is within 1/100 of a second of the other frequencies (Büschel) So all must be taking the same satellite feed (gh)

ISRAEL IBA did close all its SW broadcasts March 31 except Persian, 1400-1525 on 13850, 11605. At first Iran kept jamming the unused 9985 and 7420 (Noel R. Green, NW England, *DXLD*) Then bubble jamming audible here on 13850 (gh)

JAPAN [and non] *World Interactive*, the Saturday show on NHK, such as 1410-1429 via Sackville 11705, continued the monthly *haiku* segment after all, but got a new hostess replacing Kei Fujimoto, Sumiko-somebody, whose name did not appear on the program webpage www.nhk.or.jp/nhkworld/english/radio/wi/index.html What's left of R. Japan's English service does come up with some interesting feature angles on weekdays (gh)

JORDAN R. Jordan had been missing from most frequencies, then heard again on 9830 in mid-April at 1745-2000 (Wolfgang Büschel, Stuttgart, *DXLD*) Also unID in Arabic on 10000 at 1908 (José Miguel Romero, Spain, *ibid.*) Spur from Jordan 9830 reported on 10000 years ago (gh) I confirm it's Jordan, // 9830 around 1910 (Tarek Zeidan, Cairo, *WORLD OF RADIO*) Also here, very strong on 9830, very poor on 10000 (Romero, *ibid.*) And symmetrically on 9660 at 1750 (Mauno Ritola, Finland, *DXLD*)

KASHMIR [non] Azad Kashmir Radio, Trarkhel A-08: 0045-0215 & 1445-1815 on 4790 and 0900-1215 on 7265 via API-8, 100 kW from Islamabad; 0230-0425 & 1335-1430 on 4790 via APR-2, 10 kW from Rawalpindi (Aslam Javaid, Pakistan, *DXLD*)

KOREA NORTH [non] Shiokaze/Sea Breeze via Yamata, Japan on new 6020 ex-5985 at 1400-1430. They start just after R. Australia signs off. See http://senryaku-jouhou.jp/tayori.html (Ron Howard, CA, *DXLD*)

JSR-Shiokaze is attacked by North Korean jamming so 2030-2100 moved from 6045 to 5965 (S. Hasegawa, NDXC-HQ, Japan via *DXLD*)

Radio Free North Korea expanded to 5.5 hours/day by adding: 1330-1430 15755 and 1430-1530 11560 both via Tajikistan, and 1900-1930 9785 via Taiwan (Hiroshi via S. Hasegawa, *ibid.*)

LAOS Lao National Radio heard on 6130 two Saturdays in a row at 1412-1427, with *Business English* lessons, but not the following week. Online sked shows this is on Mon and Tue at 1415. The seven gongs at 7 pm local sometimes appear early, such as 1157:30 UT on April 9 (Ron Howard, CA, *WORLD OF RADIO*) External service in English heard on 7145 at 1345-1400* (Iwao Nagatani, *Japan Premium*) Starts at 1330 (gh)

🔊 M-F English programs for past few days now on demand via www.lnr.org.la (Dave Kernick, *Interval Signals Online* via *Media Network* blog)

LIBYA Voice of Africa, English at 1405-1602, back on 17725, fair to good signal, ex-17600. Weak, threshold on // 21695 (Brian Alexander, PA, *DXLD*)

LITHUANIA The Mighty KBC A-08: Eu 2130-2229 [daily] on 6055; NAm 0200-0259 [Sunday] on 6110 (via Ydun Ritz, *WORLD OF RADIO*) 6110 had the Wolfman at 0250 (Raúl Saavedra, Costa Rica, *DXLD*)

This transmitter also relays IRAN 6 hours a day, *q.v.*; and R. Vilnius in English: NAm 310 degrees 2330 on 9875, 0030 on 11690; Eu 259 degrees 0830 on 9710 (*DX Mix News*, Bulgaria)

Both 9875 and 11690 have Chinese music covering them (Bob Thomas, CT, *DXLD*) RFA Tibetan via Tinian on 9875 at 23-24; VOA Tibetan via Thailand on 11690 at 00-01, so of course they are heavily jammed by Firedrake! Lithuania should break relations with China, and move (gh)

MÉXICO XEXQ, R. Universidad de San Luís Potosí, missing for a couple months, heard again on 6045 from April 9 at 2230 (Julián Santiago D. de B., DF, *DXLD*) Very weak, barely audible here; seems to come on with classical music around 1250. Try 0200-0230 when interference relents (gh, OK) Tentative, at 0240 on 6044.94, very weak with splatter (Brian Alexander, PA, *DXLD*) From Vatican via Sackville 6040 (gh)

XEYU, Radio UNAM, 9599.3v, was missing again from mid-March to mid-April at least (gh, OK)

MONGOLIA Voice of Mongolia English at 1530 on 12085 heard with poor strength in March though could not confirm in February (Mike Barraclough, UK, *DXLD*) May be irregular

MOROCCO IBB stopped all VOA, RFE/RL, R. Farda broadcasts via Briech, as planned March 30. RTM could still be heard, such as 5980 at 0232 with rustic band music (gh) Also 15335 at 1234 UT, and still // Nador site on 15340 (Kai Ludwig, Germany, *DXLD*)

NETHERLANDS [non] RNW began relay exchanges with IBB in the A-08 season, including English to Asia at 0959-1057 via Philippines 15110, Tinian 11895; also broadcasts in Indonesian, Dutch (gh)

RN English to Asia at 1400-1557 changed two of three frequencies in mid-April, so Dushanbe 5830, Madagascar 9885, 11835 (*Media Network*) 9885 sometimes audible longpath in NAm (gh)

NIGERIA unID on 6024.94 believed to be FRCN Enugu reactivated, at 0450-0514

with English news, 2300-2308* (Martien Groot, Netherlands, *DXLD*) I can confirm that Radio Nigeria Enugu is indeed active again on 6025 (James MacDonell, Niger State, NW Nigeria, *ibid.*) Good news for country hunters using the NASWA list as FRCN-Enugu qualifies as Biafra (Steve Lare, *ibid.*)

NORTHERN MARIANA ISLANDS From an item in *Marianas Variety* about an increase in electric rates on Tinian, Kim Elliott computes that with all six 500 kW and two 250 kW IBB transmitters at full bore, the bill is now $1921.50 an hour (*kimandrewelliott.com*)

PAKISTAN English on SW from Radio Pakistan: Current Affairs Channel: 0300-0400 5940, 1600-1645 4835. World Service news and comment: 1100-1104 WEu 15100 17835; 1600-1615 ME 9380 11570, EAf 11625 (Aslam Javaid, Lahore, *DXLD*) At 1600 really on 9385, not 9380 (Noel R. Green, UK, *ibid.*)

PRIDNESTROVYE Radio PMR changed schedule for A-08, first noted by Chris Lewis, England. To NAm on 6040 at 2215-2345 with English at 2215 and 2300 alternating with French and German, on 6040 (as monitored by Brian Alexander, PA, *DXLD*) European service moved to 12135, at 1400-1700 with English quarters at 1400, 1445, 1530, 1615 (as monitored by José Miguel Romero, Spain, *ibid.*) Still not heard on weekends, but seems to have expanded from 4 days a week to 5 (gh)

RUSSIA [and non] VOR A08 English to NAm:

0100-0200	15425, 13775, 9665, 7250
0200-0300	13775, 9860, 9665, 9480
0300-0400	13775, 13635, 12065, 9860, 9665, 9480, 9435, 9800
0400-0500	13775, 13635, 9860, 9665, 9435 9800

On August 1, 5900 replaces 9800. 15, 13 and 12 MHz frequencies are from FE sites; 9860 Vatican, 9665 Moldova, 9480 Germany, 7250 Armenia, the rest from European Russia.

Suggestions for hearing VOR in our mornings when intended for Asia, Africa: 1400-1500 15660, 1600-1700 13855 (Glenn Hauser, OK)

SA'UDI ARABIA BSKSA Holy Qur'an Service on the huge raspy buzz transmitter 15205, 1600-1800. But Call of Islam program clear on 15435 from 1500 (gh, OK)

SERBIA [non] International Radio Serbia A08 English: 0000-0030 exc Sun, 6185 310 degrees to CNAm; 0100-0130 daily, 6185 325 degrees to WNAm. Also try 2100-2130 on 6100, 310 degrees to Eu (via Dragan Lekic, Serbia, *DXLD*) 6185 collides with XEPPM; 6195 would have been clearer. Not scheduled, but if transmitter stays on at 0030-0100 you might still hear Italian, or after 0130 Serbian (gh)

SOMALIA [non] New UN broadcast for Somalia, Integrated Regional Information Networks (IRIN), Somali news and information, daily 1730-1745 on 9665 (*kimandrewelliott.com*) via SENTECH, South Africa (gh) Audible in Europe, but co-channel from Spain (José Miguel Romero, Spain; Björn Fransson, Sweden; Matti Ponkamo, Finland, *DXLD*) Spain may not be on every day of the week (Scott Barbour, NH, *ibid.*) First time with own broadcasts on SW; see **www. irinnews.org/radio.aspx** (Chris Greenway, *ibid.*)

SOUTH AFRICA With Morocco relay no longer in use, VOA has added more relays via elsewhere including here, in English 1700-1730 11835, 1830-2000 9885 (via Kathy Otto, SENTECH) And more in Kirundi, Kurdish, Portuguese, French, Hausa

SRI LANKA [non] IBC Tamil, via WRN, kept changing frequency for the 0000-0100 daily broadcast via Wertachtal, 250 kW, 105 degrees; latest we have is 7205 (gh)

SUDAN [non] Sudan Radio Service on new 17690, at 1500-1600 daily, M-F also 1600-1700, good with Arabic radioplay, IDs in English via unknown site (Anker Petersen, Denmark, *playdx* yg) Sines, PORTUGAL, as that site has been opened up to all kinds of new clients. See also ALGERIA [non] (gh)

TANZANIA Tanzania Broadcasting Corporation (TBC) is the new name for TUT (Taasisi ya Utangazaji Tanzania - Tanzanian Broadcasting Services). You can hear the TBC ID on the 1700 Dar es Salaam news relay via Zanzibar 11735. *The Guardian* newspaper of Tanzania also reported that TBC intends to add international broadcasting in English, 12 hours a day, but may just refer to neighboring countries (Chris Greenway, England, *DXLD*)

THAILAND R. Thailand's new 12120 to ENAm at 0030-0200 turned out to be a loser, as there is almost continuous RTTY on this frequency; should go back to 12095? Not unless present occupant, DW Sri Lanka, is willing to trade (gh)

Fair to good strength at sign-on but co-channel QRM from a slightly stronger RTTY station. Thailand slowly deteriorated to a very weak level under the strong RTTY by 0050 (Brian Alexander, PA, *DXLD*) 12120 with no interference at all in Japan (Kouji Hashimoto, *Japan Premium*)

TIBET [and non] The exile radio network Voice of Tibet accused Beijing of stepping up jamming of its shortwave broadcasts during a crackdown on anti-Chinese demonstrations. The jamming contains a mixture of dragon dance music, drums and noise, and affects listening also in India, Nepal and Europe (AP via *kimandrewelliott.com*)

China started a new type jamming with electronic sounds on 15400 at 0100-0430. Target seems to be RFA-Tibetan. **http://www.ndxc.org/imgbbs/ img-box/img20080407125923.mp3** (S. Aoki via S. Hasegawa, Japan, NDXC-HQ)

Another superb program from R. Australia, Rear Vision, recounted the history of Chinese claims to Tibet. Very enlightening.

🔊 Transcript, audio: **www.abc.net.au/rn/rearvision/stories/2008/2200921. htm** (gh)

TURKEY [and non!] V. of Turkey, A-08 English had a surprise: new relay via Sackville, Canada, 7325 at 0300-0400. But the first few nights this was in Turkish by mistake until we notified Montreal, Sackville and Ankara. Greatly improves reception in C&WNAm; still direct on 5975 for ENAm. Other English: 1230 on 13685, 15450 (the latter sometimes audible here); 1830 on 9785; 2030 on 7170; 2200 on 6195 for ENAm but lost in summer noise; 0300 on 7265. The only remaining Turkish to NAm: 1530-2100 on 9460

(gh) See also CANADA

U K [non] With all English broadcasts canceled, the last remnant of BBCWS SW broadcasts to the western half of the planet is Spanish at 1200-1300 on 9410 via WHRI and 11860 via Guiana French. Spanish programming was also being cut back to news on the hour, so the rest of the hour is mostly music fill, sometimes top-10 countdowns of pop music in English; sometimes classical, rudely interrupted at 1300* Also heard a this-day-in-history bit at 1230, expendable.

Despite BBCWS' best efforts, we can still hear them in English aimed elsewhere if we look for it. For example, missing from their own schedules is 1700-1900 on 13865 from Rampisham to "western Russia" putting a surprisingly good and reliable signal into CNAm, at a time when we did not get it before (gh, OK)

U S A [and non] The A-08 frequency for VOA English to Africa from Greenville is 15410, at 1730-2000, aimed 94 degrees but with great off-the-back coverage into C&W NAm beyond the skip zone. The trouble is, CVC Miami Portuguese via Chile is already on 15410 all the way from 1100 to 2400, and which one dominates will vary. In VOA's African target area, CVC signal aimed at Brazil should carry right on, causing a big problem there, the two beams crossing in the area of Dakar-Bissau! For the music hour at 2100, the only frequency possible in NAm is 15580, Botswana.

Last summer, VOA to Africa at 0500-0700 on 6180 was via Morocco, now defunct, so that has been moved back to Greenville. Trouble is, Cuba has started using 6180, also in English at 0500-0700, so now there is a huge collision; which will cry "tío" first? VOA started A-08 with 125 kW, then doubled the power. Since Cuba doesn't participate in HFCC, how could VOA know it was there?

Another oddity in replacing Morocco is English to Africa at 1400-1500 on 17530, scheduled for the first half via Greenville eastward, and the second half via Thailand westward. But we heard Greenville going through sign-off routine until 1431, which would overlap with Thailand where the beams cross in Africa.

Most of the planned VOA relays via Bonaire did not pan out, just 1830-2030 in French on 17550. 1700-1800 via Madagascar on 13755 is the VOA *Studio 7* service for Zimbabwe (gh)

KTBN first came on the air on 24 Dec 1987 as Superpower KUSW before being taken over by TBN in 1990 (Dave Kenny, BDXC-UK) As we suspected last month, KTBN was about to close down for good as of March 30 (gh) Yes, KTBN, a client of mine since the mid 1980s, will be leaving the HF airways. With all of the "junk" on the air, this regrettably, ends 20 years of excellent religious and informational programming on HF. It will be missed (George Jacobs, *DXLD*) The equipment will be given to an undesignated party and the property where the station is located is currently on the market (Ben Miller, VP, Engineering, Trinity Broadcasting Network, Inc., *ibid.*)

Meanwhile, the two KTBN frequencies 7505 and 15590 remained vacant, but reserved now for WRNO along with 7355, which per Jacobs, still hoped to get on the air by late April (gh)

On April 2, WBCQ tried its new frequency 15420, only to collide with DW already using it several hours a day during the A-season, plus BBC, so WBCQ went right back to 17495 (gh) Just try and find a good clear in-band frequency! (Allan Weiner, WBCQ, *DXLD*) The real problem is finding a single frequency available for 10 hours straight (gh)

For A-08, WEWN English broadcasts are no longer targeted at NAm or anywhere in the western hemisphere (although they have to cross NAm to get anywhere else!). 0000-0600 11520 40 degrees to ME; 0600-0800 7570 40 to Eu; 0800-1100 9355 335 to SEAs; 1100-1400 11560 335 SEAs; 1400-1900 15855 20 to India; 1900-2200 17595 85 Af; 2200-2400 15665 85 Af (gh)

WWCR consolidated its 9 MHz frequencies to one, new 9980. This moved the mixing product with 5070 until 0158* from 4915 to 4910, that is 9980 minus 5070, heard by Brian Alexander, PA, Scott Barbour, NH and Mark Taylor, WI.

A-08 FCC Private SW Schedule [case sensitive] **www.fcc.gov/ib/sand/ neg/hf_web/A08FCC01.TXT** (via Dan Ferguson, Jim Moats, Liz Cameron, *DXLD*) They might revise it changing the last figure to 2, 3, etc., but not done lately (gh)

VENEZUELA [non] RNV via Cuba seems to be increasing the English segments, but unpredictable exactly when and for how long during otherwise Spanish hours such as 1500 on 15680 (gh, Bill Hodges, GA, *DXLD*)

[non non] RNV's own SWBC site under construction in Guárico has been named, what else, the *Centro de Onda Corta "Simón Bolívar"*. It's a long term project which will ultimately have over "30 antennas," whatever that means, per a release from the Ministry for Communication and Information (via José Miguel Romero, *DXLD*)

ZAMBIA A-08 CVC International in English via Lusaka 100 kW: WAf and Nigeria, 315 degrees at 0500-0600 9430, 0600-2100 13590. S&CAf non-dir, 0600-1600 6065, 1600-0600 4965 (*DX Mix News*, Bulgaria)

The Voice Africa, which never did anything with its original website, **http://www.voiceafrica.org/** based in RSA, decided it needed a new one: **http://www.1africa.tv/** and renamed 1-Africa. But still no program schedule, no live streaming; everything is "coming soon" (gh)

UNIDENTIFIED On 3200.13 at 1025-1034 seems a harmonic from 1600, ID sounds like R. Mía (Chuck Bolland, FL, *DXLD*) On your recording it sounds like R. Minuto me, but neither matches 1600 listings (gh) Or Radio María, which would be Guatemala (Henrik Klemetz, *RealDX* yg) I am hearing on the recording Radio Ilusión, which would be Quito, Ecuador (Mauricio Molano, Spain, *ibid.*) unID 3200.14 also heard here at 0650, too weak (Bryan Clark, *NZ DX Times*)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com
http://mt-shortwave.blogspot.com

0007 UTC on 15205
PHILIPPINES: Voice of America relay. Male/female's Indonesian comments for presumed newscast. SIO 333 (Stewart MacKenzie, Huntington Beach, CA).

🔊 On-demand and streaming audio www.voanews.com
Radio Veritas Asia 9615 (Mandarin) 1140-1155.* Programming included brief English segment on Bobby Fischer, resuming Mandarin at 1149. English station ID at 1155 to sign-off. Fair signal quality (Brian Alexander, Mechanicsburg, PA). **FEBC** via Bocaue 9920 (Vernacular) 1109-1134 religious programming to interval signal. Noted 9430 (Mandarin) 1233-1250. Religious text to 1249 announcement. Signal fair-poor, fading by tune-out.

🔊 Streaming audio www.febc.org
VOA relay 9760, *1158-1209. Interval signal, ID, jazz music to international newscast. **Radio Liberty relay** via Tinanag Poro 9520 (Russian) 1040-1100. Announcers' comments and discussion (Scott Barbour, Intervale, NH).

🔊 Streaming audio www.rferl.org/listen/

0036 UTC on 9875
LITHUANIA: Radio Vilnius. Listener letters to item on holidays in Lithuania. Contact info to English time/frequency schedule. Good signal. This appears to be irregular as frequency checked on subsequent days and heard nothing. Noted on 7325, 2337-2359 (Alexander; Barbour).

🔊 On-demand audio, video and podcast www.lrt.lt/radio/

0130 UTC on 7160
IRAN: Voice of Islamic Revolution (presumed). Orchestral music (anthem?) at tune-in. Announcers welcome announcements. No ID noted, despite mentions of "Tehran" and "voice of..." Prayers to talk on oil production. Signal began as poor, improving by 0200 (Joe Wood, Greenback, TN). 6067.03v, 2125-2130. Arabic text . Sirjan transmitter still unstable, constantly varies 20-30 hertz. (Alexander).

🔊 Streaming audio www2.irib.ir/worldservice/

0255 UTC on 6035.01
COLOMBIA: La Voz del Guaviare. Spanish announcements to local music. Station identification at 0227 and 0300. Closing announcements at 0303. National anthem at 0304. Signal fair to good, but dropped down to a poor quality at 0230 from Vatican Radio via Sackville splatter. (Alexander).

0350 UTC on 3250.05
HONDURAS: HRCP-Radio Luz y Vida. Tune-in to English religious programming and closing announcements at 0355. ID as "HRCP-Radio Light and Life" to address for reception reports. *Old Rugged Cross* song of fair-good signal quality. English schedule for Sundays and Monday only (Alexander). 0209-0220 canned ID to pops, ballads and torch music. **HRMI** 3340, (Spanish/English mix) 0503-0543 (Wood).

0430 UTC on 4904.97
CHAD: RD Nationale Tchadienne. Sign-on national anthem to opening French announcements. Afro-pop music. Also observed 2115-2132.* with French talk and pops. Closing to national anthem. Fair-good signal (Alexander). 4905, 0435-0445 with DJ's fast paced patter and Afro-pops (Wood).

0455 UTC on 3279
ECUADOR: La Voz del Napo. Spanish. Orchestral music followed by a march and ballad. Station identification at 0500. Signal fair (Wood). 3279.8, 1100-1120 (Jim Evans, Germantown, TN). Ecuador's **HCJB** 6160, 1000-1030.* This is a regularly scheduled Portuguese program. Signal good to 1020 fading, off abruptly at 1030 (Chuck Bolland, Clewiston, FL).

🔊 On-demand audio and podcast www.hcjb.org/

0710 UTC on 7320
RUSSIA: GTRK Magadan. Russian. Assume local programming, perhaps scheduled "latest news." Singing station jingle, bothered by my local noise. Radio Rossii programming, // 6075. Station ID for Rossii at 0710 before change over to local programming. **Radio Rossii** via Yakutsk 7200, 0755 including ID and news. // 5935 via Magadan, 6075 via Petropavlovsk-Kamchatka which cut away at 0810 for local "Kamchatka Radio." (Ron Howard, Monterey, CA) **Radio Free Asia relay** via Vladivostok, Russia 15565 at 2342. Vietnamese // 11605 via Taiwan, 15135 and 15550. (MacKenzie) **Radio Netherlands relay** via Petropavlovsk-Kamchatka 6040, 1015-1030 (Bolland). **IBRA Radio** Novosibirsk 7325 (Mandarin) 1211-1230* (Barbour).

1000 UTC on 3345
PAPUA NEW GUINEA: Radio Northern (Ponpondetta). Announcers talk followed by PNG pop music and announcements possibly in Pidgin. Poor signal but readable signal (SINPO 24222). Station tied with **Radio East New Britain** (3385, 1000-1030) for best PNGs of the morning. Still audible at 1100 with same signal strength. Subsequent PNG stations; **Radio Central** (Port Moresby) 3290, 1020-1030; **Radio Manus (**Lorengau) 3315, 1027-1040; **Radio Madang** (Madang) 3260, 1100-1113. (Evans). **Radio East Sepik** 3335, 1115-1130; **Radio Northern** 3345, 1119-1130 (Barbour).

1000 UTC on 9750
FRENCH GUIANA: BBC WS relay. BBC world news and features. Monitored 1000-1200 for good signal quality (Bolland).

🔊 Streaming, on-demand and podcast www.bbc.co.uk/ **Radio Japan relay**. Japanese to "Radio Nippon" ID (Bolland).

🔊 Streaming, on-demand and podcast www.nhk.or.jp/english/

1000 UTC on 4826.48
PERU: Radio Sicuani. Spanish comments to 1014, followed by Peruvian music amid terrible noise, while signal was threshold. Peruvians noted in Spanish: **Radio Luz y Sonido** (presumed) 3234.81, 1005-1015; **Radio Marañón** 4835, 1016-1030. Station ID, ads and promos.

🔊 Streaming AM/FM audio www.radiomaranon.org.pe/
Radio Libertad 4824.4, 1126-1135; **La Voz de la Selva** 4824.4, 1126-1135 (Bolland); **Radio Tarma** 4775, 1009-1036; **Radio Virgen de los Remedios** (presumed) 4111.36v, 0021-0030 (Barbour). **Radio Altura** 5014.3, 0350-0410; **Radio Luz y Sonido** 3234.8, 1100-1105 (Evans)

1013 UTC on 4781.14
BOLIVIA: Radio Tacana (presumed) Spanish. Announcer presents musical selections amid poor-weak signal with CODAR interference. Unusable by 1030. Bolivians noted in Spanish: **Radio Loyola** 5996.5, 1040-1055; **Radio Santa Cruz** 6134.8, 1053-1100 (Bolland). **Radio Mosoj Chaski** 3310 (presumed) 1015-1035. (Evans)

1055 UTC on 9526
INDONESIA: Voice of Indonesia. Noted music at tune-in to female's Mandarin language comments between tunes. English comments at 1102 noting previous segment was a Mandarin program, Signal fair.

🔊 Streaming audio www.rri-online.com/
VOI 9525.98 (Mandarin) 1125 to 1200 (Japanese) (Alexander). **VOI** 11784.87v (Spanish) 1703-1714. ID for fair signal, freq 9526v not heard today (Howard). Indo's noted in Bahasa Indonesian as; **RRI-Manokwari** 3987.05, 1244-1249; **RRI-Kendari** 3995.04, 1244-1249; **RRI-Serui** 4604.95, 1246-1250 (Evans). **RRI-Fak Fak** 4790.04, 1321-1402; **RRI-Kendari** 3995.03, 1315-1340; **RRI-Palangkaraya** 3325, 1357-1405; **RRI-Biak** 4920, 1402-1427 (John Wilkins, Wheat Ridge, CO). **RRI-Serui** 4605, 0854-0905 (Bolland).

2215 UTC on 9599.30
MEXICO: Radio UNAM. Classical music to ID announcement at 2230 and 2231, followed by Spanish talk. Lite jazz music at 2240. Station in the clear with nice signal. Usually an ID at top and bottom of each hour (Alexander).

🔊 On-demand and streaming audio www.radiounam.unam.mx

2228 UTC on 4950
ANGOLA: Radio Nacional. Portuguese news briefs to announcer's chat. SINPO 24432 (Arnaldo Slaen, Buenos Aires, Argentina).

🔊 Streaming audio for **Canal A** and **Radio Luanda** www.rna.ao/

2330 UTC on 5009.78
DOMINICAN REPUBLIC: Radio Cristal Internacional. Latin American music including pops and ballads. Spanish announcements to ID at 0000 sign-off. Fair to good signal but somewhat modulation (Alexander).

Additional loggings excluded for space constraints, are posted as **Blog Logs** on the **Shortwave Central Blog** at the above web address.

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

PROGRAMMING SPOTLIGHT

WHAT'S ON WHEN AND WHERE?

Fred Waterer
fredwaterer@monitoringtimes.com
www.doghousecharlie.com/radio

Small Nations, Booming Voices

This month, we shine the programming spotlight on a few international broadcasters who do a fantastic job despite limited resources. It's very easy to put out quality programming if you have the budget of a BBC or a VoA, but a handful of international broadcasters from relatively small nations manage to compete with the "big boys" quite well.

❖ Radio Prague

Radio Prague was always a good listen, even in the days of the Cold War, once you got past the politics. I can recall listening to many hours of programming from the then Czechoslovak Socialist Republic, not to mention regularly receiving huge parcels of magazines and other trinkets. Radio Prague was also innovative for the time, with neat little features like a (folk?) music spot, which included a countdown so you could start your tape recorder.

Then came the political upheavals of 1989, the break-up of the country into separate Czech and Slovak states, and more recently the internet revolution. One would think that this devolution would result in poorer quality broadcasts. While this was true initially, Radio Prague has bounced back in a big way.

Today's Radio Prague sends out daily half hour programs in 6 languages. They squeeze a lot into these programs, such as news and current affairs, culture and the arts, business and sport.

Radio Prague programming is top notch. Each day, the listener gets a taste of life in this Central European Nation, which has undergone a dramatic, and peaceful, transformation. One can also hear a real variety of specialized programs. Highlights include **One on One** (Mondays), **From the Archives** (Thursdays) and **Letter From Prague** (Sundays).

Radio Prague is listener friendly. Programs are available via shortwave, the internet in three different bit-rates (plus a live stream **www.radio.cz/en/live**), relay broadcasts via other broadcasters, both shortwave and domestic (such as CBC Radio One Overnight) and by satellite.

As they say on the infomercials, "But wait! There's more!!" The Radio Prague website is perhaps the best I have come across. It provides text versions (often with photographs) of all Radio Prague features. In addition, each of these web pages has a link to the audio clip of the feature in question. And these are archived going back years.

Listeners can also sign up for email delivery of daily news digests and *Radio Prague Today*, a daily newsletter with a rundown of all new articles posted at their website.

You can hear Radio Prague daily at 2130 - 2157 11600; 2230 - 2257 7345, 9415; 0000 - 0027 7345, 9440; 0100 - 0127 6200, 7345; 0300 - 0327 7345, 9870; 0330 - 0357 6080 (via Sackville, Canada). Radio Prague can also be heard via Radio Miami International at 0900 and 1400 UTC on 9955 kHz. Radio Prague can also be heard via CBC Radio One Overnight (times variable).

❖ Radio Sweden International

Sweden is the last of the Nordic countries to broadcast in English on shortwave. Over the past decade or more, Denmark, Norway, and Finland have left the air in English one by one, leaving Radio Sweden International as the lone Nordic voice to the world.

When I began listening, Radio Sweden was known for its hypnotic Interval Signal (clarinet?) and perhaps its most famous program was **Sweden Calling Dxers**. George Wood hosted it at the time, and a decade or two on, George is still there, although SCDX is long gone. George, Gaby Katz, and Bill Schiller may have some of the most recognizable voices on the world bands.

George and Gaby often host the daily program, with Bill Schiller reading the news. George has also been heard reading the news.

Gaby Katz of Radio Sweden

Monday to Thursday, one can hear "**Radio Sweden daily edition.**" According to the website

"Radio Sweden is committed to its goal of being the best source of information about Sweden in English with relevant, interesting and thought-provoking programmes for Sweden's culturally diverse society, its expatriate community, Swedes abroad and 'Swedophiles' around the world."

Each day, the listener gets a jam-packed half-hour program, looking at all things Swedish. It would probably be nice if they picked up the slack with news of their neighbouring Nordic countries, not that they are required to make up for cutbacks abroad.

A careful listen reveals a surprisingly multi-cultural nation. I had no idea of the extent to which Sweden is a major destination for immigrants and refugees in Europe.

Expanding on this theme, on Fridays, Radio Sweden presents **Inside Sweden** "carried on the national P2 network Fridays at 13:30 hrs local times as well as on shortwave, (which) connects Sweden to the world and new immigrants to Sweden." A recent edition of **Inside Sweden** looked at the Roma minority in Sweden, which is apparently quite large.

On Saturdays, one can hear a "**Review of the Week**"

On Sundays, Radio Sweden presents **Network Europe**. Radio Sweden is one of 10 partner broadcasters, which present this weekly program. You can find out more at the Network Europe website **www.networkeurope.org/**

Radio Sweden offers a daily email with the next days' program highlights.

Like Radio Prague, Radio Sweden is available via a number of means. On shortwave, try 0130-0200 6010 via Sackville; 0230-0300 6010 via Sackville; 1230-1300 15240 and 1430-1500 15240 via Sackville.

Radio Sweden programs are available online via the Radio Sweden website. In fact there is a 30-day archive of programs. Check **www.sr.se/ rs/english/**. These programs can also be downloaded as a podcast via iTunes or your podcatching software of choice. In Canada Radio Sweden is heard on CBC Overnight 0205-0230 local time (weekends 0305-0330). And it can be heard via the World Radio Network via satellite and on-line.

❖ Radio New Zealand International

Many years ago Radio New Zealand International was quite the DX catch, broadcasting with all of 7.5 kW of power. I was quite thrilled to hear them in 1983 or '84. Conditions were terrible, but I managed to dig out mentions of the "North Island,"

"Wellington," and some baseball scores, including a game in Dunedin. Since it was unlikely there was a full schedule of games in Florida in January, I was sure I had New Zealand, and sure enough, a few months later I received a very nice QSL card from RNZI.

In the 1980s, RNZI upgraded to a 100 kW transmitter making it much easier to hear, not to mention providing me with many hours of listening pleasure. For a nation with a population of just over 4 million, and a territory the size of Colorado, Radio New Zealand International delivers a popular and authoritative voice to its region.

In late 2007, Radio New Zealand International won the International Radio Station of the Year Award.

"At a function of the Association for International Broadcasting in London, RNZI was declared the category winner.

"The station was praised for its ability and clarity of vision to deliver something that's valued by audiences throughout the region…

"…Radio New Zealand International has also won the award for Most Innovative Partnership, with commendations being given to Radio Canada International and Radio Australia."

RNZI provides a mix of domestic Radio National programming, and RNZI produced programming mainly for the South Pacific.

Popular programs include **Dateline Pacific** heard Monday to Friday at 0308, 0808, 1108, 1308, 1508, 1815, and 2015 UTC.

Tagata o te Moana is a weekly Pacific magazine program featuring New Zealand and regional Pacific news, issues, information and music. Presented by Don Wiseman. Fri 1910, Sat 0405, Sun 1310 and 1810 UTC.

Mailbox is presented (fortnightly) by Myra Oh with regular contributors Bryan Clark, and John Durham who provide DX Reviews. Mon 0830, 1130, 1330, 1530 and Tue 0330 UTC.

Radio New Zealand International can be heard via shortwave on the following frequencies:

0159	0458	15720	AM	13840 DRM
0459	0658	11725	AM	9890 DRM
0659	1058	7145	AM	6170 DRM
1059	1258	9655	AM	6170 DRM
1300	1550	6170	AM	
1551	1850	7145	AM	6170 DRM
1851	1900	9615	AM	9890 DRM
1900	1935	9890	DRM	
1900	1950	9615	AM	
1936	2050	11675	DRM	
1951	2050	11725	AM	
2051	2240	15720	AM	13840 DRM
2241	0158	13840	AM	15720 DRM

🔊 RNZI also streams live via the RNZI website **www.rnzi.com/index.php**. Selected programs are also available on demand from the RNZI website and via the World Radio Network **www.wrn.org**

May I also suggest you check out the wealth of domestic Radio New Zealand programming online. I have listened online a number of times and was even called by a program, after I sent them an email (Basically they wanted to know why a Canadian was listening to Radio New Zealand!?)

❖ Genealogy on your radio

Genealogy comes from the Greek *genea*, or "family"; and *logos*, "knowledge." It is the study

and tracing of family lineages and history.

Ever done any work on your family tree? Had any interest in who your ancestors were, or what they did? I've climbed around in my family tree off and on for the past 30 years or so, and what was once a "family stump" now spreads its branches into four continents over four centuries.

There are hundreds if not thousands of websites now dedicated to this engrossing hobby. The BBC has its own contribution to your voyage of self-discovery. Outside the United Kingdom, one must rely on the internet to pick up BBC Radio 4 and BBC Radio Wales, each of which have programs devoted to genealogy. These are occasional series which can be heard for 6-10 weeks at a time, usually two or three times a year.

Radio 4 presents **Tracing Your Roots.**

"Tracing Your Roots is the series that helps put branches on your family tree.

"Each week Sally Magnusson follows the ancestral trail back in time to uncover colourful stories and hidden slices of social history. Resident genealogist Nick Barratt is on hand with tips and inspiration to help explore your own family's lineage."

🔊 www.bbc.co.uk/radio4/history/tracingyourroots.shtml

Over on Radio Wales is a program with the delightful name **Look Up Your Genes**. Charlotte Evans and Cat Whiteaway explain the science of genealogy and offer practical advice on how to trace family trees.

"Cat is the resident 'gene genie' on Radio Wales' family history show, Look Up Your Genes.

"The team has travelled the length and breadth of Wales since the series started in early 2003. You may also have heard Cat reuniting people who have lost touch on the Jamie Owen programme.

"She's answered all sorts of queries on tracking down ancestors and has uncovered some great Welsh history stories.

"These have included everything from the account of the Pembrokeshire woman transported to Australia in the 19th century for stealing money, to the sad history of Edward Stollard and his 15-year-old son William. They were both killed in a 1902 mining accident in Blaenavon on their first morning working at the pit.

"Until 2001 Cat lectured in exercise psychology at Cardiff. She then decided to turn her passion

for solving family history problems into a full-time career.

"Now she does what she does best and finds anything you've lost, apart from your hair or your marbles!"

🔊 www.bbc.co.uk/wales/radiowales/sites/presenters/pages/cat_whiteaway.shtml

The BBC also maintains a Family History website with all kinds of tips on getting started and tracking down that elusive ancestor. **www.bbc.co.uk/history/familyhistory/**

Just remember, every journey of a thousand miles begins with one step.

❖ Voice of Russia "Me and My Family"

I found this buried in the Voice of Russia website and thought it might be of some interest.

Paint your family!

"The Voice of Russia" broadcasting company and Sergey Andriaka Watercolor School [are] glad to present 'Me and My Family' project. We invite all our listeners, little ones and adults, to take part in this interesting project. Dear children, we are looking forward to your paintings! Your parents and grandparents are welcome to help you. You may send your drawings by e-mail or by conventional mail to Pyatnitskaya, 25, Moscow, 115326. The Federal State Institution, Russian State Broadcasting Company 'Voice of Russia,' World Service in Russian.

"We will tell about you and your family in our programs. The authors of the best drawings will receive some prizes. The first results will be announced on the World Children's Day, on June, 1."

Tell the world about your family! The Voice of Russia will help you in it!

www.ruvr.ru/main.php?lng=eng&w=201

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

New Cards in Queue

Are you looking to add to your card collection this summer? You still have time to collect the Radio Prague 2008 QSL card series. This year's eight card edition, titled *Czech Sporstman* includes legendary runners, gymnast, wrestlers, cyclists, footballers, hockey player Jaromir Jágr, plus tennis pro Martina Navrátilová, and decathelete Roman Šebrle. The series is online at: **www.radio.cz/en/html/qsl2008.html**

The theme of *One World...One Dream* thrives as China and

QSL
Roman Šebrle
RADIO PRAHA

QSL
Martina Navrátilová
RADIO PRAHA

the world continue their countdown to the Games of the XXIX Olympiad. The games will be held August 8-24, 2008, in Beijing. To mark this occasion, China Radio International is still offering their special QSL cards and postcards of ten Olympic sites. Send your reception reports to: 16A Shijingshan Street, Beijing 100040 People's Republic of China or via email *crieng@cri.com.cn* . To learn more about the games, visit *The Official Website of the Beijing 2008 Olympic Games* at **http://en.beijing2008.cn/**

AUSTRALIA

VL8T-Tennant Creek 4910 kHz. Partial-data personal letter from Theresa Regen-Administration Officer. Enclosed Northern Territory Frequency Guide card and six bumper stickers from Northern Territory stations. Received in eight months. Station address: ABC Northern Territory Shortwave Service, Box 9994, GPO Darwin NT 0801 Australia. (Wendel Craighead, Prairie Village, Kansas)

COLOMBIA

HJDH-Marfil Estéreo (Puerto Lleras). 5910 kHz. Full data card with personal note, station photos and Christian music. Received in one year. Station address: Colombia para Cristo, c/o Rafael Rodriguez R., Ap. A. #67751, Bogotá, D.C., Colombia. Reception report was sent to: Sr. Rodriguez at Calle 44 No. 13-67. (Craighead).

DJIBOUTI

RD TV de Djibouti, 4780 kHz. Partial data form letter with station seal, and illegible signature. Received in 132 days for an English report, $1.00US, one IRC, applause card and local postcard. Station address: Boite Postal 97, Djibouti, Republic of Djibouti. (Joe Wood, Greenback, TN)
🔊 Streaming audio and video www.rtd.dj/

MEDIUM WAVE

AR03125, 1600 kHz AM. Verification letter on Dept. of the Army letterhead, and info on Umatilla Army Chemical Depot. Friendly letter explaining the purpose of the station by Bruce E. Henrickson-Public Affairs Officer. Received in eight days. QSL address: Dept. of the Army, U.S. Army Chemical Materials Agency, Umatilla Chemical Depot, 78798 Ordinance Road, Building 1, Hermiston, OR 97838-9544 USA. (Patrick Martin, Seaside, OR)

KPJC, 1220 kHz AM. My letter returned with verie statement as "Thank you Patrick. This is your confirmation." Signed by Owner with illegible name. Received in six days. Station address: JC Media Group, Radio Web Newspaper, 3190 Lancaster Drive NE, Salem, OR 97305 USA. (Martin)

KSGT, 1340 kHz AM. *Jackson Hole Radio.* Hand-made QSL card with KSGT logo taped to the postcard, signed by "Barry." Received

in 60 days for an AM report. This one was out for a long time, as fist report was in 2006. My third Graveyard Wyoming QSL. Station address: 1140 State Highway 22, Jackson, WY 83001 USA. (Martin). Website: **www.jacksonholeradio.com/ksgt.htm**

WCSR, 670 kHz AM. *The 67 Score.* Full data prepared card returned as verified, signed by Greg Davis-Chief Engineer. Received in 16 months and three followup reports. Station address: 455 North City Front Plaza Drive, 6th Floor, Chicago, IL 60611 USA. (Martin)
🔊 Streaming audio and on-demand video **www.670thescore.com/** (Martin)

WMID, 1340 kHz AM. *Classic Oldies.* No data verification on *Equity Communications LP* letterhead. Received in 17 days for an AM report and SASE. Station address: 8025 Black Horse Pike, Suite 100. Atlantic City, NJ 08232 USA. (Eric Hopkins, Ayer, MA).
🔊 Streaming audio **www.classicoldieswmid.com/index.shtml** Station promos as "The doo wop capital of the world."

Turks & Caicos: Radio Visión Cristiana Internacional, 530 kHz AM. Full data verification on station letterhead, signed by Wendell Seymour, plus color postcard *The Atlantic Spade Fish.* Received in 13 days for an AM report and SASE. Station address: North End, South Caicos. (Hopkins)
🔊 Streaming audio **www.radiovision.net/**

MOLDOVA/ PRIDNESTROVYA/ TRANSNISTRIA

Radio PMR, via Grigoriopol, 6240 kHz. Full data verification sheet including frequency schedule and photos of antennas and buildings. Back page included maps of Pridnestrovya and data in Russian. Note apologizing for delay is signed by Vlad Butuk-Engineer of Technical Service. Received in two weeks. QSL address: ul. Rozy Lyuksemburg 10, MD 3300 Tiraspol, Moldova. No mention of Pridnestrovya in the address. Reported frequency 7370 kHz, was not mentioned in verie. (Craighead).

Family Radio Worldwide/WYFR via Grigoripol, 7430 kHz. Full data card *Three Decades of* Faithful Service, with site notation. Received in 39 days for an email report to: *intl@familyradio.com* (Edward Kusalik, Alberta, Canada)

PIRATE

WTCR-Twentieth Century Radio, 6925 kHz. Full data color spaceship card, signed by Dr. Morbius. Received in 43 days for a pirate report, mint stamps (used for reply) and address label (not used). Station maildrop: Box 1, Belfast, NY 14711 USA. (Bill Wilkins, Springfield, MO)

RUSSIA

Family Radio Worldwide/WYFR via Krasnodar, 7175 kHz. Full data card *Three Decades of Faithful Service*, with site notation, plus religious materials. Received in total seven months, three after followup email to: *intl@familyradio.com* (Kusalik)

UTILITY

Non-Directional Beacons
H7 388 kHz. Manitoulin East (Manitowaning). Full data prepared QSL card returned as verified, signed as Airport Manager, plus color airport brochure. Power listed as 25 watts. Received in 45 for a utility report. QSL address: Manitoulin East Municipal Airport Commission, Postal Bag 2000, Little Current ON Canada P0P 1K0. (Jim Pogue KH2AR, Memphis, TN)

MTH 260 kHz. Full data prepared QSL card returned as verified, signed by Barbara J. Ward-Senior Office Asst. Power listed as 1, 680 watts. Received in seven days for a utility report. QSL address: Marathan Airport, Manager's Office, Suite 200, 9400 Overseas Highway, Marathon FL 33050 USA. (Pogue)

YNC 385 kHz. Wenmindji, QC Canada. Full date prepared QSL card returned as verified. Power listed as 25 watts. Received in 23 days for an SAE and $1.00US. QSL address: Nav Canada Technical Operations, Atten: Jean-Maurice Beaulieu-Gestionnaire, 1750 chemin St. François, Dorval QC Canada H9P 2P6. (Pogue)

YSK 208 kHz. Sanikiluaq, Nunavut, Canada. Full data prepared QSL card returned as verified. Power listed as 500 watts. Received in 91 days for an SAE and $1.00US. QSL address: (see YNC) My first NDB verification from this Canadian province. (Pogue)

HOW TO USE THE SHORTWAVE GUIDE

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0000-0100 twhfa    USA, Voice of America    5995am   6130ca   7405am   9455af
    ①   ②  ⑤         ③          ④                    ⑥  ⑦
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Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Saving Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ① , then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Codes
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment prob-

lems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

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Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo/NASWA Flash Sheet; Rachel Baughn/MT; Alokesh Gupta, New Delhi, India; Anker Petersen/DSWCI-DX Window; Adrian Sainsbury/R NZ Intl; Evelyn Marcy/WYFR; Leo van der Woude, Netherlands; Ivo Ivanov; Robert Thomas, Bridgeport, CT; Jose Jacob VU2JOS, Hyderabad, India; Tom Taylor, UK; Harold Sellers/ODXA/DX Ontario; Wolfgang Büeschel, Germany; Jaisakthivel, Chennai, India; Robert Scaglione, Italy; Daniel Sampson, WI; Andreas Volk, Germany; Ardic DX Club; BCL News; Cumbre DX; AOKI; EIBI; BDX Club; DX Mix News, Bulgaria; Hard Core DX; NASWA Journal/NASWA Flashsheet; ;World Wide DX Club-Top News.

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.

Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.

Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

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0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

Start	End	Days	Station	Freq	Freq	Freq	Freq
0000	0000		UK, BBC World Service	5970as	6195as		
				7105as	9410as	9740as	11955as
				15335as	15360as	17615as	
0000	0005		Canada, R Canada International	6100na			
0000	0020		Japan, NHK World/Radio Japan	5920eu			
				6145na	13650as	17810as	
0000	0027		Czech Rep, Radio Prague	7345na	9440na		
0000	0030		Australia, HCJB Global	15525as			
0000	0030	mtwhfa	Serbia, International Radio Serbia	6185na			
0000	0030		Thailand, Radio Thailand	9680af			
0000	0030		USA, Voice of America	7555as			
0000	0045		Egypt, Radio Cairo	9280eu			
0000	0045		India, All India Radio	9705as	9950as		
				11620as	11645as	13605as	
0000	0045		USA, WYFR/Family Radio Worldwide	17805sa			
0000	0056		Romania, R Romania International	9775na			
				11790na			
0000	0057		Canada, R Canada International	11700as			
0000	0057		Netherlands, Radio Netherlands	9845na			
0000	0100		Anguilla, Worldwide Univ Network	6090am			
0000	0100		Australia, ABC NT Alice Springs	2310do			
				4835do			
0000	0100		Australia, ABC NT Katherine 5025do				
0000	0100		Australia, ABC NT Tennant Creek	4910do			
0000	0100		Australia, Radio Australia	9660as	12080as		
				13690as	15240pa	17715as	17750va
				17775va	17795va		
0000	0100		Canada, CFVP Calgary AB	6030na			
0000	0100		Canada, CKZN St John's NF 6160na				
0000	0100		Canada, CKZU Vancouver BC	6160na			
0000	0100		China, China Radio International	6020na			
				6075as	6180as	7130eu	9570na
				11885as	13750as	15125as	
0000	0100		Costa Rica, Worldwide Univ Network	5030va			
				6150va	7375va	9725va	
0000	0100		Germany, Deutsche Welle	9885as	15595as		
				17525as			
0000	0100		Guyana, Voice of Guyana	3291do			
0000	0100		Malaysia, RTM/Traxx FM	7295as			
0000	0100	DRM	New Zealand, Radio NZ International	15720pa			
0000	0100		New Zealand, Radio NZ International	13840pa			
0000	0100	vl	Papua New Guinea, Wantok R. Light	7325va			
0000	0100		Singapore, MediaCorp Radio	6150do			
0000	0100		Spain, Radio Exterior Espana 6055na				
0000	0100		Ukraine, R Ukraine International	7440na			
0000	0100		USA, American Forces Radio	4319usb			
				5446usb	5765usb	6350usb	7811usb
				10320usb	12132usb	13362usb	
0000	0100	Sat	USA, WBCQ Monticello ME	15420am	17495am		
0000	0100		USA, WBCQ Monticello ME	5110am	7415am		
				9330am			
0000	0100		USA, WBOH Newport NC	5920am			
0000	0100		USA, WEWN Vandiver AL	11520va			
0000	0100		USA, WHRA Greenbush ME	5850eu			
0000	0100	m	USA, WHRI Cypress Creek SC	5875na			
0000	0100	twhfa	USA, WHRI Cypress Creek SC	11735na			
0000	0100		USA, WHRI Cypress Creek SC	7315am			
0000	0100		USA, WINB Red Lion PA	9265am			
0000	0100		USA, WRMI Miami FL	9955am			
0000	0100		USA, WTJC Newport NC	9370na			
0000	0100		USA, WWCR Nashville TN	5070na	5935na		
				7465na	9980na		
0000	0100		USA, WWRB Manchester TN	3185va	5050va		
				5745va	6180va		
0000	0100		USA, WYFR/Family Radio Worldwide	6985na			
				9505na	11835ca		
0000	0100		Zambia CVC Intl/Christian Voice	4965af			
0005	0057	twhfa	Canada, R Canada International	6100na			
0030	0045	twhfas	Albania, Radio Tirana	9390na			
0030	0045	Sun	Germany, Pan American BC 9640as				
0030	0100		Australia, Radio Australia	15415as			
0030	0100		China, China Radio International	11730as			
0030	0100		Lithuania, Radio Vilnius	11690na			
0030	0100		Thailand, Radio Thailand	12120na			
0030	0100	fas	UK, Bible Voice BC	9490as			
0030	0100		USA, Voice of America	9715va	9780va		
				11725va	15185va	15205va	15290va
				15560va	17820va		

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

Start	End	Days	Station	Freq	Freq	Freq	Freq
0100	0105	twhfa	Canada, R Canada International	6100na			
0100	0127		China, China Radio International	11730as			
0100	0127		Czech Rep, Radio Prague	6200na	7345na		
0100	0127		Slovakia, R Slovakia International	5930na			
				9440sa			
0100	0128		Vietnam, Voice of Vietnam	6175na			
0100	0130		Australia, Radio Australia	17775as			
0100	0130	mtwhfa	Serbia, International Radio Serbia	6185na			
0100	0155		Turkey, Voice of Turkey	9620am			
0100	0157		China, China Radio International	6020na			
				6175as	9470eu	9535as	9570na
				9580na	9790na	11870as	
0100	0157		Netherlands, Radio Netherlands	9845na			
0100	0158	DRM	New Zealand, Radio NZ International	15720pa			
0100	0158		New Zealand, Radio NZ International	13840pa			
0100	0159		Canada, R Canada International	9620as			
0100	0200		Anguilla, Worldwide Univ Network	6090am			
0100	0200	twhfa	Argentina, RAE 11710am				
0100	0200		Australia, ABC NT Katherine 5025do				
0100	0200		Australia, ABC NT Tennant Creek	4910do			
0100	0200		Australia, Radio Australia	9660as	12080as		
				13690as	15240pa	15415as	17715as
				17795va			
0100	0200		Canada, CFVP Calgary AB	6030na			
0100	0200		Canada, CKZN St John's NF 6160na				
0100	0200		Canada, CKZU Vancouver BC	6160na			
0100	0200		Costa Rica, Worldwide Univ Network	5030va			
				6150va	7375va	9725va	
0100	0200		Cuba, Radio Havana Cuba	6000na	6180na		
0100	0200		Guyana, Voice of Guyana	3291do			
0100	0200		Indonesia, Voice of Indonesia	9525al			
				11785pa	15150as		
0100	0200		Malaysia, RTM/Traxx FM	7295as			
0100	0200		North Korea, Voice of Korea	7140as	9345as		
				9730as	11735sa	13760sa	15180sa
0100	0200	vl	Papua New Guinea, Wantok R. Light	7325va			
0100	0200		Russia, Voice of Russia	7250na	9665na		
				13755na	15425na		
0100	0200		Singapore, MediaCorp Radio	6150do			
0100	0200		Sri Lanka, SLBC 6005as	9770as	15745as		
0100	0200		Taiwan, R Taiwan International	11875as			
0100	0200		UK, BBC World Service	7320as	9410as		
				9740as	11750as	11955as	15310as
				15335as	15360as	17615as	
0100	0200		USA, American Forces Radio	4319usb			
				5446usb	5765usb	6350usb	7811usb
				10320usb	12133usb	13362usb	
0100	0200		USA, KWHR Naalehu HI	17800as			
0100	0200		USA, Voice of America	7430va	9780va		
				11705as			
0100	0200		USA, WBCQ Monticello ME	5110am	7415am		
				9330am			
0100	0200		USA, WBOH Newport NC	5920am			
0100	0200		USA, WEWN Vandiver AL	11520va			
0100	0200		USA, WHRA Greenbush ME	5850eu			
0100	0200	twhfa	USA, WHRI Cypress Creek SC	11735na			
0100	0200	sm	USA, WHRI Cypress Creek SC	7315am			
0100	0200		USA, WHRI Cypress Creek SC	5875na			
0100	0200		USA, WINB Red Lion PA	9265am			
0100	0200		USA, WRMI Miami FL	9955am			
0100	0200		USA, WTJC Newport NC	9370na			
0100	0200		USA, WWCR Nashville TN	5070na	5935na		
				7465na	9980na		
0100	0200		USA, WWRB Manchester TN	3185va	5050va		
				5745va	6180va		
0100	0200		USA, WWRB Manchester TN	3185va	5050va		
				5745va	6180va		
0100	0200		USA, WYFR/Family Radio Worldwide	6985na			
				9505na	15195as		
0100	0200		Uzbekistan, CVC International	11790as			
0100	0200		Zambia, CVC Intl/Christian Voice	4965af			
0130	0200		Iran, Voice of the Islamic Rep of Iran	7235na			
				9495na			
0130	0200		Sweden, Radio Sweden	6010na			
0130	0200	twhfa	USA, Voice of America	6040va	9820va		
0145	0200	twhfas	Albania, Radio Tirana	9390na			
0159	0200		New Zealand, Radio NZ International	15720pa			

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

Start	End	Days	Station	Freq	Freq
0200	0230		Iran, Voice of the Islamic Rep of Iran	7235na	
				9495na	
0200	0230		South Korea, KBS World Radio	9580sa	
0200	0230		Thailand, Radio Thailand	15275na	
0200	0245		USA, WYFR/Family Radio Worldwide	11835ca	
0200	0257		China, China Radio International	11770as	
				13640na	
0200	0259	Sun	Lithuania, Mighty KBC Radio 6055na		
0200	0300		Anguilla, Worldwide Univ Network	6090am	
0200	0300		Australia, ABC NT Alice Springs	2310do	
				4835do	
0200	0300		Australia, ABC NT Katherine 5025do		
0200	0300		Australia, ABC NT Tennant Creek	4910do	
0200	0300		Australia, Radio Australia	9660as	12080as

Start	End	Days	Country, Station	Frequencies
				13690as 15240pa 15415as 15515as 17750va 21725va
0200	0300		Bulgaria, Radio Bulgaria	9700na 11700na
0200	0300		Canada, CFVP Calgary AB	6030na
0200	0300		Canada, CKZN St John's NF	6160na
0200	0300		Canada, CKZU Vancouver BC	6160na
0200	0300		Costa Rica, Worldwide Univ Network	5030va 6150va 7375va 9725va
0200	0300		Cuba, Radio Havana Cuba	6000na 6180na
0200	0300		Egypt, Radio Cairo	7270na
0200	0300		Guyana, Voice of Guyana	3291do
0200	0300		Malaysia, RTM/Traxx FM	7295as
0200	0300		New Zealand, Radio NZ International	15720pa
0200	0300	DRM	New Zealand, Radio NZ International	13840pa
0200	0300		North Korea, Voice of Korea	15100as
0200	0300	vl	Papua New Guinea, Wantok R. Light	7325va
0200	0300		Philippines, Radio Pilipinas	12025va 15285va 17770va
0200	0300		Russia, Voice of Russia	9480na 9665na 9860na 13635na 15425na
0200	0300		Singapore, MediaCorp Radio	6150do
0200	0300		Sri Lanka, SLBC	6005as 9770as 15745as
0200	0300		Taiwan, R Taiwan International	5950na 9680as
0200	0300		UK, BBC World Service	6035af 6195as 9410va 11955as 15310as
0200	0300		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
0200	0300		USA, KJES Vado NM	7555na
0200	0300		USA, KJES Vado NM	7555na
0200	0300		USA, KWHR Naalehu HI	17800as
0200	0300		USA, Voice of America	9780va 11705va
0200	0300		USA, WBCQ Monticello ME	5110am 7415am 9330am
0200	0300		USA, WBOH Newport NC	5920am
0200	0300		USA, WEWN Vandiver AL	11520va
0200	0300		USA, WHRA Greenbush ME	5850eu
0200	0300	sm	USA, WHRI Cypress Creek SC	7315am
0200	0300	twhfa	USA, WHRI Cypress Creek SC	5875na
0200	0300		USA, WHRI Cypress Creek SC	7385na
0200	0300		USA, WINB Red Lion PA	9265am
0200	0300		USA, WRMI Miami FL	9955am
0200	0300		USA, WTJC Newport NC	9370na
0200	0300		USA, WWCR Nashville TN	3215na 5070na 5890na 5935na
0200	0300		USA, WWRB Manchester TN	3185va 5050va 5745va 6180va
0200	0300		USA, WYFR/Family Radio Worldwide	5985am 6985na 9505na 11855am
0200	0300		Uzbekistan, CVC International	11790as
0200	0300		Zambia, CVC Intl/Christian Voice	4965af
0215	0230		Nepal, Radio Nepal	5005as
0230	0257		China, China Radio International	15435me
0230	0258		Vietnam, Voice of Vietnam	6175ca
0230	0300	twhfas	Albania, Radio Tirana	7425na
0230	0300		Netherlands, Radio Netherlands	11550as
0230	0300		South Korea, KBS World Radio	9560na
0230	0300		Sweden, Radio Sweden	6010na 11550va
0245	0300		Myanmar, Myanma Radio	9730do
0250	0300		Vatican City, Vatican Radio	6040na 7305na
0255	0300	vl	Rwanda, Radio Rwanda	6055do

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

Start	End	Days	Country, Station	Frequencies
0300	0315	vl	Croatia, Croatian Radio	9925na
0300	0319		Vatican City, Vatican Radio	6040na 7305na
0300	0327		Czech Rep, Radio Prague	7345na 9870na
0300	0327		Vatican City, Vatican Radio	7360af 9660af
0300	0330		Egypt, Radio Cairo	7270na
0300	0330		Myanmar, Myanma Radio	9730do
0300	0330		Philippines, Radio Pilipinas	12025va 15285va 17770va
0300	0330		Sri Lanka, SLBC	6005as 9770as 15745as
0300	0330	Sun	Swaziland, Trans World Radio	3200af
0300	0330	mtwhf	UK, Sudan Radio Service	5975af
0300	0330		USA, KJES Vado NM	7555na
0300	0330		USA, WBCQ Monticello ME	5110am 7415am 9330am
0300	0355		Turkey, Voice of Turkey	5975am 7265va 7325na
0300	0356		Romania, R Romania International	6150na 9645as 9735as 11895as
0300	0357		China, China Radio International	9690na 9790na 15110as 11770as 13750as 15120as 15785as
0300	0400		Anguilla, Worldwide Univ Network	6090am
0300	0400		Australia, ABC NT Alice Springs	2310do 4835do
0300	0400		Australia, ABC NT Katherine	5025do
0300	0400		Australia, ABC NT Tennant Creek	4910do
0300	0400		Australia, Radio Australia	9660as 12080as 13690as 15240pa 15415as 15515as 17750va 21725va
0300	0400	twhfas	Canada, CBC NQ SW Service	9625na
0300	0400		Canada, CFVP Calgary AB	6030na
0300	0400		Canada, CKZN St John's NF	6160na
0300	0400		Canada, CKZU Vancouver BC	6160na
0300	0400		Costa Rica, Worldwide Univ Network	5030va 6150va 7375va 9725va
0300	0400		Cuba, Radio Havana Cuba	6000na 6180na
0300	0400		Germany, Deutsche Welle	13770as 15595as
0300	0400		Guyana, Voice of Guyana	3291do
0300	0400		Malaysia, RTM/Traxx FM	7295as
0300	0400		Malaysia, RTM/Voice of Malaysia	6175as 9750as 15295as
0300	0400		Netherlands, Radio Netherlands	6165na
0300	0400		New Zealand, Radio NZ International	15720pa
0300	0400	DRM	New Zealand, Radio NZ International	13840pa
0300	0400		North Korea, Voice of Korea	7140as 9345as 9730as
0300	0400		Oman, Radio Oman	15355as
0300	0400	vl	Papua New Guinea, Wantok R. Light	7325va
0300	0400		Russia, Voice of Russia	5900na 9800na 9435na 9480na 9665na 9860na 12065na 15735na
0300	0400	vl	Rwanda, Radio Rwanda	6055do
0300	0400		Singapore, MediaCorp Radio	6150do
0300	0400		South Africa, Channel Africa	3345af 6105af
0300	0400		Taiwan, R Taiwan International	5950na 15215sa 15320as
0300	0400		UK, BBC World Service	3255af 6005af 6145af 6190af 6195as 7160af 9410va 9750af 12035af 15360as 15310as 17790as
0300	0400		Ukraine, R Ukraine International	7440na
0300	0400		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
0300	0400		USA, KWHR Naalehu HI	17800as
0300	0400		USA, Voice of America	4930af 6080af 9885af 12085af 15580af
0300	0400		USA, WBOH Newport NC	5920am
0300	0400		USA, WEWN Vandiver AL	11520va
0300	0400		USA, WHRA Greenbush ME	5850eu
0300	0400	twhfa	USA, WHRI Cypress Creek SC	5875na 6110am
0300	0400	sm	USA, WHRI Cypress Creek SC	7315am 7385na
0300	0400		USA, WRMI Miami FL	9955am
0300	0400		USA, WTJC Newport NC	9370na
0300	0400		USA, WWCR Nashville TN	3215na 5070na 7465na 5935na
0300	0400		USA, WWRB Manchester TN	3185va 5050va 5745va 6180va
0300	0400		USA, WYFR/Family Radio Worldwide	6085na 9505na 11740sa 15255sa
0300	0400		Uzbekistan, CVC International	13680as 15515as
0300	0400		Zambia, CVC Intl/Christian Voice	4965af
0330	0335		Bahrain, Radio Bahrain	6010as
0330	0357		Czech Rep, Radio Prague	6080na 9445as 11600as
0330	0358		Vietnam, Voice of Vietnam	6175ca
0330	0400	twhfas	Albania, Radio Tirana	7425na
0330	0400		UK, BBC World Service	11945af

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

Start	End	Days	Country, Station	Frequencies
0400	0430	mtwhf	France, Radio France International	9805af 11995af
0400	0430		Netherlands, Radio Netherlands	9575af
0400	0430		USA, KWHR Naalehu HI	17800as
0400	0430		USA, Voice of America	4930af 4960af 6080af 9575af 11835af 12080af 15580af
0400	0430		USA, WWRB Manchester TN	3185va
0400	0445		USA, WYFR/Family Radio Worldwide	6985na 9505na
0400	0457		China, China Radio International	6020na 6080as 13750as 15120as 15785as 17730as 17855as
0400	0457		Netherlands, Radio Netherlands	6165na
0400	0458		New Zealand, Radio NZ International	15720pa
0400	0458	DRM	New Zealand, Radio NZ International	13840pa
0400	0500		Anguilla, Worldwide Univ Network	6090am
0400	0500		Australia, ABC NT Alice Springs	2310do 4835do

Start	End	Days	Station	Frequencies
0400	0500		Australia, ABC NT Katherine	5025do
0400	0500		Australia, ABC NT Tennant Creek	4910do
0400	0500		Australia, Radio Australia 9660as 12080as 13690as 15240pa 15415as 17750va 21725va	
0400	0500	twhfas	Canada, CBC NQ SW Service	9625na
0400	0500		Canada, CKZN St John's NF	6160na
0400	0500		Canada, CKZU Vancouver BC	6160na
0400	0500		Costa Rica, Worldwide Univ Network 6150va 7375va 9725va	5030va
0400	0500		Cuba, Radio Havana Cuba 6000na	6180na
0400	0500		Germany, Deutsche Welle 7225af 12045af 15445af	7245af
0400	0500		Guyana, Voice of Guyana	3291do
0400	0500		Malaysia, RTM/Traxx FM	7295as
0400	0500		Malaysia, RTM/Voice of Malaysia 9750as 15295as	6175as
0400	0500		Netherlands, Radio Netherlands	12080af
0400	0500	vl	Papua New Guinea, Wantok R. Light	7325va
0400	0500		Russia, Voice of Russia 5900na 9665na 9860na 13635na 15735as	9800na
0400	0500	vl	Rwanda, Radio Rwanda	6055do
0400	0500		Singapore, MediaCorp Radio	6150do
0400	0500		South Africa, Channel Africa	3345af
0400	0500	vl	Uganda, UBC Radio 4976do	5026do
0400	0500		UK, BBC World Service 3255af 6005af 6190af 6195va 7120af 7160af 11945af 12035va 12095as 15360as 15565va 17790as	
0400	0500		USA, American Forces Radio 4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb	
0400	0500	mtwhfa	USA, WBCQ Monticello ME	7415am
0400	0500		USA, WBOH Newport NC	5920am
0400	0500		USA, WEWN Vandiver AL	11520va
0400	0500		USA, WHRA Greenbush ME	5850eu
0400	0500		USA, WHRI Cypress Creek SC 7365am	7315am
0400	0500		USA, WMLK Bethel PA	9265am
0400	0500		USA, WRMI Miami FL	9955am
0400	0500		USA, WTJC Newport NC	9370na
0400	0500		USA, WWCR Nashville TN 3215na 7465na 5935na	5070na
0400	0500		USA, WWRB Manchester TN	3185va
0400	0500		USA, WYFR/Family Radio Worldwide 7780va 9715ca	6915na
0400	0500		Uzbekistan, CVC International 15515as	13680as
0400	0500		Zambia, CVC Intl/Christian Voice	4965af
0430	0500		Australia, Radio Australia	15415as
0430	0500		Nigeria, Radio Nigeria/Kaduna	6090do
0430	0500	mtwhf	Swaziland, Trans World Radio 4775af	3200af
0459	0500		New Zealand, Radio NZ International	11725pa
0459	0500	DRM	New Zealand, Radio NZ International	9890pa

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

Start	End	Days	Station	Frequencies
0500	0507	twhfas	Canada, CBC NQ SW Service	9625na
0500	0527		Vatican City, Vatican Radio 9660af 13765af	11625af
0500	0529	`	Vatican City, Vatican Radio 5965eu	7250eu
0500	0530	mtwhf	France, Radio France International 15160af	13680af
0500	0530		Germany, Deutsche Welle 9700af	9825me
0500	0530		Japan, NHK World/Radio Japan 5975eu 6110na 11970af 15325as 17810as	
0500	0557		China, China Radio International 6020na 6190na 11880as 15350as 15465as 17505me 17730as 17855as	
0500	0600		Anguilla, Worldwide Univ Network	6090am
0500	0600		Australia, ABC NT Alice Springs 4835do	2310do
0500	0600		Australia, ABC NT Katherine	5025do
0500	0600		Australia, ABC NT Tennant Creek	4910do
0500	0600		Australia, Radio Australia 9660as 12080as 13630as 13690pa 15160as 15240pa 17750va	
0500	0600		Bhutan, Bhutan Broadcasting Svc	6035as
0500	0600		Canada, CKZN St John's NF	6160na
0500	0600		Canada, CKZU Vancouver BC	6160na
0500	0600		Costa Rica, Worldwide Univ Network 6150va 7375va 9725va	5030va
0500	0600		Cuba, Radio Havana Cuba 6000na 6180na 9550na 11760am	6060na
0500	0600		Guyana, Voice of Guyana	3291do
0500	0600		Malaysia, RTM/Traxx FM	7295as
0500	0600		Malaysia, RTM/Voice of Malaysia 9750as 15295as	6175as

Start	End	Days	Station	Frequencies
0500	0600		New Zealand, Radio NZ International	11725pa
0500	0600	DRM	New Zealand, Radio NZ International	9890pa
0500	0600		Nigeria, Radio Nigeria/Kaduna	4770af
0500	0600	vl	Papua New Guinea, Wantok R. Light	7325va
0500	0600		Russia, Voice of Russia 17635pa	21790pa
0500	0600		Singapore, MediaCorp Radio	6150do
0500	0600		South Africa, Channel Africa	7230af 9735af
0500	0600		Swaziland, Trans World Radio	3200af
0500	0600		Swaziland, Trans World Radio 6120af 9500af	4775af
0500	0600	vl	Uganda, UBC Radio 4976do	5026do
0500	0600		UK, BBC World Service 3255af 6005af 6190af 6195va 7120af 7160af 9410va 11945af 12095as 15310as 15360as 15420af 15565va 17640af 17790as	
0500	0600		Ukraine, R Ukraine International	9945eu
0500	0600		USA, American Forces Radio 4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb	
0500	0600	mtwhfa	USA, KWHR Naalehu HI	13650as
0500	0600		USA, Voice of America 4930af 6080af 6180af 12080af 15580af	
0500	0600		USA, WBCQ Monticello ME	5110am
0500	0600		USA, WBOH Newport NC	5920am
0500	0600		USA, WEWN Vandiver AL	11520va
0500	0600		USA, WHRA Greenbush ME	7490va
0500	0600		USA, WHRI Cypress Creek SC 7365am	7315am
0500	0600		USA, WMLK Bethel PA	9265am
0500	0600		USA, WRMI Miami FL	9955am
0500	0600		USA, WTJC Newport NC	9370na
0500	0600		USA, WWCR Nashville TN 3215na 7465na 5935na	5070na
0500	0600		USA, WWRB Manchester TN	3185va
0500	0600		USA, WYFR/Family Radio Worldwide 9355va	6915na
0500	0600		Uzbekistan, CVC International 15515as	13680as
0500	0600		Zambia, CVC Intl/Christian Voice 9430af	4965af
0515	0530	vl	Rwanda, Radio Rwanda	6055do
0530	0556		Romania, R Romania International 11830eu 15435pa 17770pa	9655eu
0530	0600		Australia, Radio Australia	15415as
0530	0600	vl	Rwanda, Radio Rwanda	6055do
0530	0600		Thailand, Radio Thailand	17655va
0530	0600	mtwhf	UK, Sudan Radio Service	9525af 13720af

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

Start	End	Days	Station	Frequencies
0600	0600		USA, WHRI Cypress Creek SC 7365am	7315am
0600	0615	Sat/Sun	South Africa, Trans World Radio	11640af
0600	0630	mtwhf	France, Radio France International 15160af 17800af 17800af	11725af
0600	0630		Germany, Deutsche Welle 7310af	15275af
0600	0630		Nigeria, Radio, National Svc/Abuja	7275do
0600	0645	mtwhf	South Africa, Trans World Radio	11640af
0600	0657		China, China Radio International 11710af 11870me 11880as 13660as 15140me 15350as 15465as 17505va 17540as 17710as	
0600	0658		New Zealand, Radio NZ International	11725pa
0600	0658	DRM	New Zealand, Radio NZ International	9890pa
0600	0700		Anguilla, Worldwide Univ Network	6090am
0600	0700		Australia, ABC NT Alice Springs 4835do	2310do
0600	0700		Australia, ABC NT Katherine	5025do
0600	0700		Australia, ABC NT Tennant Creek	4910do
0600	0700		Australia, CVC International	15335as
0600	0700	Sat/Sun	Australia, Radio Australia	15415as
0600	0700		Australia, Radio Australia 9660as 12080as 13630as 13690as 15160as 15240pa 15415as 15515pa 17750va	
0600	0700		Canada, CFVP Calgary AB	6030na
0600	0700		Canada, CKZN St John's NF	6160na
0600	0700		Canada, CKZU Vancouver BC	6160na
0600	0700		Costa Rica, Worldwide Univ Network 6150va 7375va 9725va 11870va	5030va
0600	0700		Cuba, Radio Havana Cuba 6000na 6180na 9550na 11760na	6060va
0600	0700		Guyana, Voice of Guyana	3291do
0600	0700		Malaysia, RTM/Traxx FM	7295as
0600	0700		Malaysia, RTM/Voice of Malaysia 9750as 15295as	6175as
0600	0700		Nigeria, Radio Nigeria/Kaduna	4770do
0600	0700	vl	Papua New Guinea, Wantok R. Light	7325va
0600	0700		Russia, Voice of Russia 17635pa	21790pa

0600	0700		Singapore, MediaCorp Radio	6150do
0600	0700		South Africa, Channel Africa 7230af	15255af
0600	0700		Swaziland, Trans World Radio	4775af
			6120af 9500af	
0600	0700		UK, BBC World Service 6005af	6190af
			6195va 9860af 11765af	12095as
			13820af 15310as 15400af	17640af
			17790as	
0600	0700	Sat/Sun	UK, BBC World Service 15420af	
0600	0700		USA, American Forces Radio 4319usb	
			5446usb 5765usb 6350usb 7811usb	
			10320usb 12133usb 13362usb	
0600	0700	mtwhf	USA, KWHR Naalehu HI 13650as	
0600	0700		USA, Voice of America 6080af	12080af
			15580af	
0600	0700		USA, WBCQ Monticello ME 5110am	
0600	0700		USA, WBOH Newport NC 5920am	
0600	0700		USA, WEWN Vandiver AL 7570eu	
0600	0700		USA, WHRA Greenbush ME 7490va	
0600	0700		USA, WMLK Bethel PA 9265am	
0600	0700		USA, WRMI Miami FL 9955am	
0600	0700		USA, WTJC Newport NC 9370na	
0600	0700		USA, WWCR Nashville TN 3215na	5070na
			7465na 5935na	
0600	0700		USA, WWRB Manchester TN 3185va	
0600	0700		USA, WYFR/Family Radio Worldwide	5850na
			7520va 9680va 11530af	11580va
0600	0700		Uzbekistan, CVC International	15515as
0600	0700	vl	Vanuatu, Radio Vanatu 7260do	
0600	0700		Zambia, CVC Intl/Christian Voice	6065af
			13590af	
0630	0644	mtwhfa	Vatican City, Vatican Radio 5965eu	7250eu
			9645eu 11740eu 15595eu	
0630	0700		Bulgaria, Radio Bulgaria 7200na	9400eu
0630	0700		Vatican City, Vatican Radio 11625af	13765af
			15570af	
0645	0700	Sun	Germany, Trans World Radio Europe 6105eu	
0645	0700	Sun	Monaco, Trans World Radio Europe 9800eu	
0659	0700		New Zealand, Radio NZ International 7145pa	
0659	0700	DRM	New Zealand, Radio NZ International 6170pa	

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0703	vl	Croatia, Croatian Radio 11690pa	
0700	0706		UK, BBC World Service 6005af	
0700	0727		Czech Rep, Radio Prague 9880eu	11600eu
0700	0727		Slovakia, R Slovakia International	9440pa
			11650pa	
0700	0730		France, Radio France International	13675af
0700	0730	mtwhf	UK, BBC World Service 15575as	
0700	0745		USA, WYFR/Family Radio Worldwide 7520va	
0700	0750	mtwhf	Germany, Trans World Radio Europe 6105eu	
0700	0750	mtwhf	Monaco, Trans World Radio Europe 9800eu	
0700	0757		China, China Radio International 11880as	
			13660as 13710eu 15350as	15465as
			17490eu 17540as 17710as	
0700	0800		Anguilla, Worldwide Univ Network 6090am	
0700	0800		Australia, ABC NT Alice Springs 2310do	
			4835do	
0700	0800		Australia, ABC NT Katherine 5025do	
0700	0800		Australia, ABC NT Tennant Creek 4910do	
0700	0800		Australia, CVC International 15335as	
0700	0800		Australia, Radio Australia 9475as	9660as
			9710as 13630pa 15160as	15240pa
			15415as 17750va	
0700	0800		Bhutan, Bhutan Broadcasting Svc 6035as	
0700	0800		Canada, CFVP Calgary AB 6030na	
0700	0800		Canada, CKZN St John's NF 6160na	
0700	0800		Canada, CKZU Vancouver BC	6160na
0700	0800		Costa Rica, Worldwide Univ Network 5030va	
			6150va 7375va 9725va	11870va
0700	0800	Sun	Germany, Trans World Radio Europe 6105eu	
0700	0800		Guyana, Voice of Guyana 3291do	5950do
0700	0800	Sat	Latvia, Radio SWH 9290eu	
0700	0800		Liberia, Star Radio 9525af	
0700	0800		Malaysia, RTM/Traxx FM 7295as	
0700	0800		Malaysia, RTM/Voice of Malaysia 6175as	
			9750as 15295as	
0700	0800	Sun	Monaco, Trans World Radio Europe 9800eu	
0700	0800		Myanmar, Myanma Radio 9730do	
0700	0800		New Zealand, Radio NZ International 7145pa	
0700	0800	DRM	New Zealand, Radio NZ International 6170pa	
0700	0800		Nigeria, Radio Nigeria/Kaduna 4770do	
0700	0800	vl	Papua New Guinea, Wantok R. Light 7325va	
0700	0800		Russia, Voice of Russia 17495af	17635af
0700	0800		Singapore, MediaCorp Radio 6150do	
0700	0800	vl	Solomon Islands, SIBC 5020do	
0700	0800		South Africa, Channel Africa 7230af	
0700	0800		Swaziland, Trans World Radio	4775af

			6120af 9500af	
0700	0800		Taiwan, R Taiwan International	5950na
0700	0800	Sat/Sun	UK, BBC World Service 15400af	15420af
			15575as	
0700	0800		UK, BBC World Service 6190af	9860af
			11760me 13820af 15310as	17790as
			17830af	
0700	0800	mtwhf	UK, BBC World Service 15400af	
0700	0800	Sat/Sun	UK, Bible Voice BC 5945eu	
0700	0800		USA, American Forces Radio 4319usb	
			5446usb 5765usb 6350usb 7811usb	
			10320usb 12133usb 13362usb	
0700	0800	mtwhf	USA, KWHR Naalehu HI 13650as	
0700	0800		USA, WBCQ Monticello ME 5110am	
0700	0800		USA, WBOH Newport NC 5920am	
0700	0800		USA, WEWN Vandiver AL 7570eu	
0700	0800		USA, WHRI Cypress Creek SC 7315am	
0700	0800		USA, WHRI Cypress Creek SC 5875va	
			7315am	
0700	0800		USA, WMLK Bethel PA 9265am	
0700	0800		USA, WRMI Miami FL 9955am	
0700	0800		USA, WTJC Newport NC 9370na	
0700	0800		USA, WWCR Nashville TN 3215na	5070na
			7465na 5935na	
0700	0800		USA, WWRB Manchester TN 3185va	
0700	0800		USA, WYFR/Family Radio Worldwide	5985na
			6915na 9505na 9715na	9930af
0700	0800		Uzbekistan, CVC International	15515as
0700	0800	vl	Vanuatu, Radio Vanatu 7260do	
0700	0800		Zambia, CVC Intl/Christian Voice	6065af
			13590af	
0715	0750	Sat	Germany, Trans World Radio Europe	6105eu
0715	0750	Sat	Monaco, Trans World Radio Europe	9800eu
0745	0800	f	UK, Bible Voice BC 5945eu	

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0815	Sat	Guam, KTWR/Trans World Radio	11840pa
0800	0815	Sat/Sun	UK, Bible Voice BC 5945eu	
0800	0820	Sun	Germany, Trans World Radio Europe	6105eu
0800	0820	Sun	Monaco, Trans World Radio Europe	9800eu
0800	0825		Malaysia, RTM/Voice of Malaysia	6175as
			9750as 15295as	
0800	0830		Australia, ABC NT Katherine 5025do	
0800	0830		Australia, ABC NT Tennant Creek	4910do
0800	0830		Myanmar, Myanma Radio 9730do	
0800	0835	mtwhf	Guam, KTWR/Trans World Radio	11840pa
0800	0845		USA, WYFR/Family Radio Worldwide	5950ca
			9930af	
0800	0857		China, China Radio International 11620as	
			11880as 13710eu 15350as	15465as
			17490eu 17540as	
0800	0900		Anguilla, Worldwide Univ Network 6090am	
0800	0900		Australia, ABC NT Alice Springs 2310do	
			4835do	
0800	0900		Australia, CVC International 15335as	
0800	0900		Australia, Radio Australia 9475as	9580va
			9590va 9710as 12080pa	13630as
			15415as 17750va	
0800	0900		Bhutan, Bhutan Broadcasting Svc 6035as	
0800	0900		Canada, CFVP Calgary AB 6030na	
0800	0900		Canada, CKZN St John's NF 6160na	
0800	0900		Canada, CKZU Vancouver BC	6160na
0800	0900		Costa Rica, Worldwide Univ Network 5030va	
			6150va 7375va 9725va	11870va
0800	0900	DRM	Germany, Deutsche Welle 12005as	
0800	0900		Guyana, Voice of Guyana 3291do	5950do
0800	0900		Indonesia, Voice of Indonesia	9525al
			11785pa 15150as	
0800	0900		Malaysia, RTM/Traxx FM 7295as	
0800	0900		New Zealand, Radio NZ International 7145pa	
0800	0900	DRM	New Zealand, Radio NZ International 6170pa	
0800	0900		Nigeria, Radio Nigeria/Kaduna 4770do	
0800	0900		Nigeria, Voice of Nigeria/Lagos 9690af	
0800	0900		Papua New Guinea, National BC 4890do	
0800	0900	vl	Papua New Guinea, Wantok R. Light 7325va	
0800	0900		Russia, Voice of Russia 17495af	17635af
0800	0900	DRM	Russia, Voice of Russia 12060eu	15545eu
0800	0900		Singapore, MediaCorp Radio 6150do	
0800	0900	vl	Solomon Islands, SIBC 5020do	
0800	0900	Sun	South Africa, SA Radio League 7205af	
			17570af	
0800	0900		South Korea, KBS World Radio 9570as	
0800	0900		Swaziland, Trans World Radio 4775af	
			6120af 9500af	
0800	0900		UK, BBC World Service 6190af	9860af
			11760me 15310as 15400af	17640as
			17790af 17830af 21470af	
0800	0900	Sat/Sun	UK, BBC World Service 15575as	

0800	0900		USA, American Forces Radio			4319usb
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb		
0800	0900		USA, KNLS Anchor Point AK	7355as		
0800	0900		USA, WBCQ Monticello ME	5110am		
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Vandiver AL	9355as		
0800	0900		USA, WHRI Cypress Creek SC	7315am		
0800	0900	mtwhf	USA, WHRI Cypress Creek SC	11565va		
0800	0900	Sat/Sun	USA, WHRI Cypress Creek SC	5875va		
0800	0900		USA, WMLK Bethel PA	9265am		
0800	0900		USA, WRMI Miami FL	9955am		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3215na	5070na	
			7465na	5935na		
0800	0900		USA, WWRB Manchester TN	3185va		
0800	0900		USA, WYFR/Family Radio Worldwide	5985na		
			6915na			
0800	0900		Uzbekistan, CVC International	15515as		
0800	0900	vl	Vanuatu, Radio Vanatu	7260do		
0800	0900		Zambia, CVC Intl/Christian Voice	6065af		
			13590af			
0805	0900	tf	Guam, KTWR/Trans World Radio	15170as		
0820	0900	w	Guam, KTWR/Trans World Radio	15170as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900	m	Guam, KTWR/Trans World Radio	15170as		
0830	0900		Lithuania, Radio Vilnius	9710na		

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0926		Czech Rep, Radio Prague	9880eu	9955am
			21745as		
0900	0930		Japan, NHK World/Radio Japan		9625as
			9825pa	11815as	15590as
0900	0957		China, China Radio International		11620as
			15210pa	15270eu	15350as	17490eu
			17570eu	17690eu	17750as
0900	1000		Anguilla, Worldwide Univ Network	6090am
0900	1000		Australia, ABC NT Alice Springs	2310do
			4835do	
0900	1000		Australia, ABC NT Katherine	2485do
0900	1000		Australia, ABC NT Tennant Creek	2325do
0900	1000		Australia, CVC International	15230as
0900	1000		Australia, Radio Australia	9475va	9580va
			9590va	9710as	11880as	11945pa
			12080as	15415as	
0900	1000		Bhutan, Bhutan Broadcasting Svc	6035as
0900	1000		Canada, CFVP Calgary AB	6030na
0900	1000		Canada, CKZN St John's NF	6160na
0900	1000		Canada, CKZU Vancouver BC	6160na
0900	1000		Costa Rica, Worldwide Univ Network	5030va
			6150va	7375va	9725va	11870va
			13750va	
0900	1000		Germany, Deutsche Welle	15340as	17705as
0900	1000		Guyana, Voice of Guyana	3291do	5950do
0900	1000		Malaysia, RTM/Traxx FM	7295as
0900	1000		New Zealand, Radio NZ International	7145pa
0900	1000	DRM	New Zealand, Radio NZ International	6170pa
0900	1000		Nigeria, Radio Nigeria/Kaduna	4770do
0900	1000		Nigeria, Voice of Nigeria/Lagos	9690af
0900	1000		Papua New Guinea, National BC	4890do
0900	1000	vl	Papua New Guinea, Wantok R. Light	7325va
0900	1000		Saudi Arabia, BSKSA	15250af
0900	1000		Singapore, MediaCorp Radio	6150do
0900	1000	vl	Solomon Islands, SIBC	5020do
0900	1000		UK, BBC World Service	6190af	6195as
			9740as	9860af	11760me	15310as
			15400af	15575as	17640af	17760as
			17790as	17830af	21470af	21660as
0900	1000		Ukraine, R Ukraine International	11550eu
0900	1000		USA, American Forces Radio		4319usb
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb
0900	1000		USA, WBCQ Monticello ME	5110am
0900	1000		USA, WBOH Newport NC	5920am
0900	1000		USA, WEWN Vandiver AL	9355as
0900	1000		USA, WHRI Cypress Creek SC	5875na
			7315am	
0900	1000		USA, WRMI Miami FL	9955am
0900	1000		USA, WTJC Newport NC	9370na
0900	1000		USA, WWCR Nashville TN	5070na	5890na
			5935na	9985na	
0900	1000		USA, WWRB Manchester TN	3185va
0900	1000		USA, WYFR/Family Radio Worldwide	5985na
			6915na	9465as	9755ca
0900	1000	vl	Vanuatu, Radio Vanatu	7260do
0900	1000		Zambia, CVC Intl/Christian Voice	6065af
			13590af	

0905	1000	Sun	Greece, Voice of Greece	9420eu	15605eu
0930	1000	Sun	Italy, IRRS	9510va	
0930	1000	Sun	Slovakia, European Gospel Radio	9510af

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1030		Mongolia, Voice of Mongolia	12085as
1000	1030		Vietnam, Voice of Vietnam	9840as	12020as
1000	1057		China, China Radio International	6040na
			11610as	11635as	13590as	13620as
			13720as	15190as	15210pa	15350as
			15390as	17490eu	17690pa
1000	1057		Netherlands, Radio Netherlands	5955eu
			11895as	12065as	13820as	15110as
1000	1058		New Zealand, Radio NZ International	7145pa
1000	1058	DRM	New Zealand, Radio NZ International	6170pa
1000	1100		Anguilla, Worldwide Univ Network	11775am
1000	1100		Australia, ABC NT Alice Springs	2310do
			4835do	
1000	1100		Australia, ABC NT Katherine	2485do
1000	1100		Australia, ABC NT Tennant Creek	2325do
1000	1100		Australia, CVC International	15230as
1000	1100		Australia, Radio Australia	9580as	9590va
			9710as	11880as	11945pa	12080pa
			15415as	
1000	1100		Canada, CFVP Calgary AB	6030na
1000	1100		Canada, CKZN St John's NF	6160na
1000	1100		Canada, CKZU Vancouver BC	6160na
1000	1100		Costa Rica, Worldwide Univ Network	5030va
			6150va	7375va	9725va	11870va
			13750va	
1000	1100		Guyana, Voice of Guyana	3291do	5950do
1000	1100		India, All India Radio	7270as	13695pa
			15020as	15260as	15410as	17510pa
			17800as	17895pa
1000	1100	Sun	Italy, IRRS	9510va
1000	1100		Malaysia, RTM/Traxx FM	7295as
1000	1100		Nigeria, Radio Nigeria/Kaduna	4770do
1000	1100		Nigeria, Voice of Nigeria/Lagos	9690af
1000	1100		North Korea, Voice of Korea	6185as	6285sa
			9335sa	9850as	
1000	1100		Papua New Guinea, National BC	4890do
1000	1100	vl	Papua New Guinea, Wantok R. Light	7325va
1000	1100		Saudi Arabia, BSKSA	15250af
1000	1100		Singapore, MediaCorp Radio	6150do
1000	1100	Sun	Slovakia, European Gospel Radio	9510af
1000	1100	vl	Solomon Islands, SIBC	5020do
1000	1100		UK, BBC World Service	6195as	9740as
			11760me	15575as	17640af	17760as
			17790as	21470af	21660as
1000	1100	Sat/Sun	UK, BBC World Service	15400af	17830af
1000	1100		USA, American Forces Radio		4319usb
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb
1000	1100		USA, KNLS Anchor Point AK	6890as
1000	1100		USA, WBOH Newport NC	5920am
1000	1100		USA, WEWN Vandiver AL	9355as
1000	1100		USA, WHRI Cypress Creek SC	7315am
			9425am	
1000	1100		USA, WINB Red Lion PA	9265am
1000	1100		USA, WRMI Miami FL	9955am
1000	1100		USA, WTJC Newport NC	9370na
1000	1100		USA, WWCR Nashville TN	5070na	5890na
			5935na	15825na	
1000	1100		USA, WWRB Manchester TN	3185va
1000	1100		USA, WYFR/Family Radio Worldwide	5940na
			5985na	6915na	9465na	9755ca
1000	1100		Zambia, CVC Intl/Christian Voice	6065af
			13590af	
1015	1045	Sun	UK, Bible Voice BC	5985as
1030	1057		Czech Rep, Radio Prague	9880eu	11665eu
1030	1100		Guam, KSDA/ Adventist World Radio	11780as
1030	1100		Iran, Voice of the Islamic Rep of Iran	15600as
			17600as	
1059	1100		New Zealand, Radio NZ International	9655pa
1059	1100	DRM	New Zealand, Radio NZ International	6170pa

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1130		Iran, Voice of the Islamic Rep of Iran	15600as
			17600as	
1100	1130		UK, BBC World Service	15400af
1100	1130		Vietnam, Voice of Vietnam	7285as
1100	1145		USA, WYFR/Family Radio Worldwide	9550sa
			9755ca	
1100	1157		China, China Radio International	5955as
			6040na	11650as	11660as	11750as
			11795as	13590as	13620eu	13720as

Start	Stop	Days	Station	Frequencies
				13645as 17490eu
1100	1200		Anguilla, Worldwide Univ Network	11775am
1100	1200		Australia, ABC NT Alice Springs	2310do 4835do
1100	1200		Australia, ABC NT Katherine	2485do
1100	1200		Australia, ABC NT Tennant Creek	2325do
1100	1200		Australia, CVC International	15635as
1100	1200		Australia, Radio Australia	5995va 6020va 9475as 9560as 9590va 11880as 11945pa 12080as
1100	1200	Sat/Sun	Canada, CBC NQ SW Service	9625na
1100	1200		Canada, CFVP Calgary AB	6030na
1100	1200		Canada, CKZN St John's NF	6160na
1100	1200		Canada, CKZU Vancouver BC	6160na
1100	1200		Costa Rica, Worldwide Univ Network	5030va 6150va 7375va 9725va 11870va 13750va
1100	1200	Sun	Italy, IRRS	9510va
1100	1200		Malaysia, RTM/Traxx FM	7295as
1100	1200		New Zealand, Radio NZ International	9655pa
1100	1200	DRM	New Zealand, Radio NZ International	6170pa
1100	1200		Nigeria, Radio Nigeria/Kaduna	4770do
1100	1200		Nigeria, Voice of Nigeria/Lagos	9690af
1100	1200		Papua New Guinea, National BC	4890do
1100	1200	vl	Papua New Guinea, Wantok R. Light	7325va
1100	1200		Saudi Arabia, BSKSA	15250af
1100	1200		Singapore, R Singapore International	6080as 6150as
1100	1200	Sun	Slovakia, European Gospel Radio	9510af
1100	1200	vl	Solomon Islands, SIBC	5020do 9545al
1100	1200		Taiwan, R Taiwan International	7445as
1100	1200		UK, BBC World Service	6190af 6195as 9740as 9860af 11760me 15310as 15340as 15575as 17640af 17760as 17790as 17830af 21470af
1100	1200		Ukraine, R Ukraine International	11550eu
1100	1200		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
1100	1200		USA, WBOH Newport NC	5920am
1100	1200		USA, WEWN Vandiver AL	11560as
1100	1200		USA, WHRI Cypress Creek SC	7315am 9425am
1100	1200		USA, WINB Red Lion PA	9265am
1100	1200		USA, WRMI Miami FL	9955am
1100	1200		USA, WTJC Newport NC	9370na
1100	1200		USA, WWCR Nashville TN	5935na 7465na 9980na 15825na
1100	1200		USA, WWRB Manchester TN	3185va
1100	1200		USA, WYFR/Family Radio Worldwide	5950na 5985na 7780sa 9625sa
1100	1200		Zambia, CVC Intl/Christian Voice	6065af 13590af
1115	1130		UK, Bible Voice BC	5950as
1130	1200		Bulgaria, Radio Bulgaria	11700eu 15700eu
1130	1200		Guam, KSDA/ Adventist World Radio	15460as
1130	1200		Vatican City, Vatican Radio	15595eu 17765eu
1157	1200		Netherlands, Radio Netherlands	5955eu

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

Start	Stop	Days	Station	Frequencies
1200	1230		Australia, HCJB Global	15400as
1200	1230		France, Radio France International	17800af
1200	1230		Germany, Adventist World Radio Europe	15435as
1200	1230		Japan, NHK World/Radio Japan	6120na 9625as 9695as 17585eu
1200	1230		Saudi Arabia, BSKSA	15250af
1200	1245		USA, WYFR/Family Radio Worldwide	5950na 5985na
1200	1256		Romania, R Romania International	11875eu 15220eu
1200	1257		China, China Radio International	5955as 9460as 9600as 9645as 9730as 9760pa 11650as 11660as 11760pa 11980as 13645as 13650eu 13790eu 17490eu
1200	1258		New Zealand, Radio NZ International	9655pa
1200	1258	DRM	New Zealand, Radio NZ International	6170pa
1200	1259		Netherlands, Radio Netherlands	5955eu
1200	1259		Poland, Polish Radio	7330eu 9525eu
1200	1300		Anguilla, Worldwide Univ Network	11775am
1200	1300		Australia, ABC NT Alice Springs	2310do 4835do
1200	1300		Australia, ABC NT Katherine	2485do
1200	1300		Australia, ABC NT Tennant Creek	2325do
1200	1300		Australia, CVC International	13635as
1200	1300		Australia, Radio Australia	6020va 9475as 9560pa 9580va 9590va 11880as 11945pa
1200	1300	DRM	Australia, Radio Australia	5995va
1200	1300	Sat/Sun	Canada, CBC NQ SW Service	9625na
1200	1300		Canada, CFVP Calgary AB	6030na
1200	1300		Canada, CKZN St John's NF	6160na
1200	1300		Canada, CKZU Vancouver BC	6160na
1200	1300		Costa Rica, Worldwide Univ Network	9725va 11870va 13750va
1200	1300	Sun	Latvia, Radio SWH	9290eu
1200	1300		Malaysia, RTM/Traxx FM	7295as
1200	1300		Nigeria, Radio Nigeria/Kaduna	4770do
1200	1300		Nigeria, Voice of Nigeria/Lagos	9690af
1200	1300		Papua New Guinea, National BC	4890do
1200	1300	vl	Papua New Guinea, Wantok R. Light	7325va
1200	1300		Singapore, R Singapore International	6080as 6150as
1200	1300	vl	Solomon Islands, SIBC	5020do 9545al
1200	1300		South Korea, KBS World Radio	9650na
1200	1300	Fri/ DRM	Taiwan, R Taiwan International	9850eu
1200	1300		UK, BBC World Service	6190af 6195as 9740as 9860af 11750as 11760me 15310as 15575as 17640af 17790as 17830af 21470af
1200	1300		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
1200	1300		USA, KNLS Anchor Point AK	7355as 9780as
1200	1300	Sun	USA, KWHR Naalehu HI	12130as
1200	1300		USA, Voice of America	6140va 9360va 9645va 9760va 12075va
1200	1300		USA, WBOH Newport NC	5920am
1200	1300		USA, WEWN Vandiver AL	11560as
1200	1300		USA, WHRA Greenbush ME	15710va
1200	1300		USA, WHRI Cypress Creek SC	7385na
1200	1300	Sat/Sun	USA, WHRI Cypress Creek SC	9410am
1200	1300		USA, WINB Red Lion PA	13570am
1200	1300		USA, WRMI Miami FL	9955am
1200	1300		USA, WTJC Newport NC	9370na
1200	1300		USA, WWCR Nashville TN	7465na 9980na 13845na 15825na
1200	1300		USA, WWRB Manchester TN	3185va
1200	1300		USA, WYFR/Family Radio Worldwide	11520as 11560as 17555sa 17795ca
1200	1300		Zambia, CVC Intl/Christian Voice	6065af 13590af
1215	1300		Egypt, Radio Cairo	17835as
1228	1300	vl	Vatican City, Vatican Radio	11850as
1230	1300	mtwhfa	Australia, HCJB Global	15540as
1230	1300		Bangladesh, Bangla Betar	7185as
1230	1300		Sweden, Radio Sweden	15240na
1230	1300		Thailand, Radio Thailand	9835va
1230	1300		Turkey, Voice of Turkey	13685va 15450eu
1230	1300		Vietnam, Voice of Vietnam	9840as 12020as
1245	1300	Sat	UK, Bible Voice BC	5950as

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

Start	Stop	Days	Station	Frequencies
1300	1325		Turkey, Voice of Turkey	13685pa 15450eu
1300	1329		Czech Rep, Radio Prague	13580eu 17540as
1300	1330	mtwhfa	Australia, HCJB Global	15540as
1300	1330		Egypt, Radio Cairo	17835af
1300	1330		Serbia, International Radio Serbia	7200eu
1300	1330	Sun	Slovakia, Universal Life	15750as
1300	1357		China, China Radio International	5955as 9570na 9650na 9730as 9760pa 9765as 9870as 11660as 11760p[a 11980as 13610eu 13755as 13790eu 15260na 15440as
1300	1400		Anguilla, Worldwide Univ Network	11775am
1300	1400		Australia, CVC International	13635as
1300	1400		Australia, Radio Australia	6020va 9560as 9580va 9590va
1300	1400	DRM	Australia, Radio Australia	5995va
1300	1400	Sat/Sun	Canada, CBC NQ SW Service	9625na
1300	1400		Canada, CFVP Calgary AB	6030na
1300	1400		Canada, CKZN St John's NF	6160na
1300	1400		Canada, CKZU Vancouver BC	6160na
1300	1400		Costa Rica, Worldwide Univ Network	9725va 11870va 13750va
1300	1400		Malaysia, RTM/Traxx FM	7295as
1300	1400		New Zealand, Radio NZ International	6170pa
1300	1400		Nigeria, Radio Nigeria/Kaduna	4770do
1300	1400		Nigeria, Voice of Nigeria/Lagos	9690af
1300	1400		North Korea, Voice of Korea	7570eu 9335na 11710na 12015eu
1300	1400		Papua New Guinea, National BC	4890do
1300	1400	vl	Papua New Guinea, Wantok R. Light	7325va
1300	1400		Singapore, R Singapore International	6080as 6150as

Start	End	Notes	Station	Frequencies
1300	1400	vl	Solomon Islands, SIBC	5020do 9545al
1300	1400		South Korea, KBS World Radio	9570na 9770as
1300	1400		UK, BBC World Service	6190af 6195as 9740as 9860af 11750as 11760me 15310as 15420af 15575as 17640af 17790as 21470af
1300	1400		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
1300	1400	Sat/Sun	USA, KWHR Naalehu HI	12130as
1300	1400		USA, Voice of America	9645va 9760va
1300	1400	Sun	USA, WBCQ Monticello ME	15420am 17495am
1300	1400		USA, WBOH Newport NC	5920am
1300	1400		USA, WEWN Vandiver AL	11560as
1300	1400		USA, WHRA Greenbush ME	15710va
1300	1400	Sat/Sun	USA, WHRI Cypress Creek SC	9840na
1300	1400		USA, WINB Red Lion PA	13570am
1300	1400		USA, WRMI Miami FL	9955am
1300	1400		USA, WTJC Newport NC	9370na
1300	1400		USA, WWCR Nashville TN	7465na 9980na 13845na 15825na
1300	1400		USA, WWRB Manchester TN	9285va
1300	1400		USA, WYFR/Family Radio Worldwide	11560as 11820na 11865na 11910na 17795ca
1300	1400	vl	Vatican City, Vatican Radio	11850as
1300	1400		Zambia, CVC Intl/Christian Voice	6065af 13590af
1305	1320	m	Austria, Radio Austria International	13730eu
1305	1330	Sat/Sun	Austria, Radio Austria International	13730eu
1310	1340		Japan, NHK World/Radio Japan	11985as
1330	1357	fa/ DRM	Czech Rep, Radio Prague	9850eu
1330	1400	mt	Guam, KSDA/ Adventist World Radio	15275as
1330	1400	hfa	Guam, KSDA/ Adventist World Radio	15275as
1330	1400		India, All India Radio	9690as 11620as 13710as
1330	1400		Laos, National Radio	7145as
1330	1400		USA, Voice of America	9465va 11725va 15130va 15565va
1330	1400		Vietnam, Voice of Vietnam	9840as 12020as
1335	1400	Sat/Sun	Austria, Radio Austria International	13730eu
1345	1400	hf	Austria, Radio Austria International	13730eu
1355	1400		Guam, KTWR/Trans World Radio	9975as

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

Start	End	Notes	Station	Frequencies
1400	1415	Sat	Germany, Pan American BC	15205me
1400	1430	Sun	Australia, HCJB Global	15425as
1400	1430		Australia, HCJB Global	15400as
1400	1430	sw	Germany, Pan American BC	15205as
1400	1430	mhf	Guam, KTWR/Trans World Radio	9975as
1400	1430	`	Japan, NHK World/Radio Japan	11705va 11985as 13630eu 21560eu
1400	1430		Thailand, Radio Thailand	9805va
1400	1430	Sun	United Arab Emirates, FEBA	12025as
1400	1457		China, China Radio International	5995as 9765as 9870as 11675as 11765as 13685af 13710eu 13740na 13790eu 17630af
1400	1457		Czech Rep, Radio Prague	9955am
1400	1500		Anguilla, Worldwide Univ Network	11775am
1400	1500		Australia, CVC International	13635as
1400	1500		Australia, Radio Australia	5995va 6080va 7240va 9590va
1400	1500		Bhutan, Bhutan Broadcasting Svc	6035as
1400	1500	Sat/Sun	Canada, CBC NQ SW Service	9625na
1400	1500		Canada, CFVP Calgary AB	6030na
1400	1500		Canada, CKZN St John's NF	6160na
1400	1500		Canada, CKZU Vancouver BC	6160na
1400	1500		Costa Rica, Worldwide Univ Network	9725va 11870va 13750va
1400	1500	DRM	Germany, CVC Intl/Voice Africa	7270eu
1400	1500	tw	Guam, KTWR/Trans World Radio	9975as
1400	1500		India, All India Radio	9690as 11620as 13710as
1400	1500		Jordan, Radio Jordan	11690na
1400	1500		Libya, Voice of Africa	17725af 21695af
1400	1500		Malaysia, RTM/Traxx FM	7295as
1400	1500		Netherlands, Radio Netherlands	5850as 9885as 11835as
1400	1500		New Zealand, Radio NZ International	6170pa
1400	1500		Nigeria, Radio Nigeria/Kaduna	4770do
1400	1500		Nigeria, Voice of Nigeria/Lagos	9690af
1400	1500		Oman, Radio Oman	15140as
1400	1500	vl	Papua New Guinea, Wantok R. Light	7325va
1400	1500	DRM	Russia, Voice of Russia	9650eu
1400	1500		Russia, Voice of Russia	7165as 7255as 9625as 9660as 9745as 11755as 15605as 15660as

Start	End	Notes	Station	Frequencies
1400	1500		Singapore, MediaCorp Radio	6150do
1400	1500	vl	Solomon Islands, SIBC	5020do 9545al
1400	1500		UK, BBC World Service	5980as 6190af 6195as 9740as 11920as 12095as 15310as 17640af 17830af 21470af
1400	1500	Sat/Sun	UK, Bible Voice BC	15680as
1400	1500		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
1400	1500		USA, KJES Vado NM	11715na
1400	1500		USA, KNLS Anchor Point AK	7355as
1400	1500		USA, Voice of America	4930af 6080af 7125va 9760va 13570af 15185va 15530va 15580af 17530af 17740va
1400	1500	Sun	USA, WBCQ Monticello ME	15420am 17495am
1400	1500		USA, WBCQ Monticello ME	9930am
1400	1500		USA, WBOH Newport NC	5920am
1400	1500		USA, WEWN Vandiver AL	15855as
1400	1500		USA, WHRA Greenbush ME	15195va
1400	1500	Sat/Sun	USA, WHRI Cypress Creek SC	9840na 11785na
1400	1500		USA, WINB Red Lion PA	13570am
1400	1500		USA, WRMI Miami FL	9955am
1400	1500		USA, WTJC Newport NC	9370na
1400	1500		USA, WWCR Nashville TN	7465na 9980na 13845na 15825na
1400	1500		USA, WWRB Manchester TN	9385va
1400	1500		USA, WYFR/Family Radio Worldwide	11560na 11830na 11910na 13695na 17795ca
1400	1500	vl	Vatican City, Vatican Radio	11850as
1400	1500		Zambia, CVC Intl/Christian Voice	6065af 13590af
1415	1430	mtwhfa	Germany, Pan American BC	15205as
1415	1430		Nepal, Radio Nepal	5005as
1430	1445	Sun	Germany, Pan American BC	15205as
1430	1459		Vatican City, Vatican Radio	4885eu 7250eu 9645eu
1430	1500	mtwhfa	Albania, Radio Tirana	13640na
1430	1500		Australia, Radio Australia	9475va 11660pa
1430	1500		Ethiopia, Radio Ethiopia	5990af 7110af 9704af
1430	1500	f/ DRM	South Korea, KBS World Radio	9460eu
1430	1500		Sweden, Radio Sweden	13820va 15240na

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

Start	End	Notes	Station	Frequencies
1500	1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu
1500	1528		Vietnam, Voice of Vietnam	7285va 9840va 12020va
1500	1530		Guam, KSDA/ Adventist World Radio	11985as
1500	1530		Nigeria, Radio, National Svc/Abuja	7275do
1500	1530		UK, BBC World Service	7380af 11860af 15420af
1500	1530	Sat/Sun	UK, Sudan Radio Service	9840af
1500	1530	vl	Venezuela, R Nacional de Venezuela	11680sa
1500	1545		USA, WYFR/Family Radio Worldwide	15770sa
1500	1550		New Zealand, Radio NZ International	6170pa
1500	1550	vl	Vatican City, Vatican Radio	11850as
1500	1557		Canada, R Canada International	11675as 17720as
1500	1557		China, China Radio International	5955as 6100af 7160as 7325as 9800as 9870as 11965eu 13640eu 13685af 13740na 17630af
1500	1557		Netherlands, Radio Netherlands	5830af 9885as 11835as
1500	1600		Anguilla, Worldwide Univ Network	11775am
1500	1600		Australia, CVC International	13635as
1500	1600		Australia, Radio Australia	5995va 6080va 7240va 9475va 9590as 11660pa
1500	1600	Sat/Sun	Canada, CBC NQ SW Service	9625na
1500	1600		Canada, CFVP Calgary AB	6030na
1500	1600		Canada, CKZN St John's NF	6160na
1500	1600		Canada, CKZU Vancouver BC	6160na
1500	1600		Costa Rica, Worldwide Univ Network	9725va 11870va 13750va
1500	1600		Finland, Overcomer Ministries	9595me
1500	1600	DRM	Germany, CVC Intl/Voice Africa	7270eu
1500	1600		Italy, IRRS	9825af
1500	1600		Jordan, Radio Jordan	11690na
1500	1600		Libya, Voice of Africa	17725af 21695af
1500	1600		Malaysia, RTM/Traxx FM	7295as
1500	1600		Myanmar, Myanma Radio	5985as
1500	1600		Nigeria, Radio Nigeria/Kaduna	4770do
1500	1600		Nigeria, Voice of Nigeria/Lagos	9690af
1500	1600		North Korea, Voice of Korea	7570eu 9335na 11710na 12015eu
1500	1600	vl	Papua New Guinea, Wantok R. Light	7325va
1500	1600		Russia, Voice of Russia	4965va 9810eu

Start	End	Days	Station	Freq	Freq	Freq	Freq
1500	1600		Singapore, MediaCorp Radio	6150do			
1500	1600	vl	Slovakia, Miraya FM Radio	9825af			
1500	1600	vl	Solomon Islands, SIBC	5020do	9545al		
1500	1600		South Africa, Channel Africa	15215af			
1500	1600		Uganda, Dunamis Shortwave	4750af			
1500	1600		UK, BBC World Service	5975as	5980as		
				6190af	6195as	9740as	9860af
				11920as	12095va	15310as	15400af
				17640af	17830af	21470af	
1500	1600	Sat/Sun	UK, BBC World Service	7380af	15420af		
1500	1600		USA, American Forces Radio	4319usb			
				5446usb	5765usb	6350usb	7811usb
				10320usb	12133usb	13362usb	
1500	1600		USA, KJES Vado NM	11715na			
1500	1600		USA, Voice of America	6160va	7125va		
				7480va	9590va	9695va	9760va
				12150va	13570af	13735va	15310va
				15530va	15550va	15580af	17895af
1500	1600	Sun	USA, WBCQ Monticello ME	15420am	17495am		
1500	1600		USA, WBCQ Monticello ME	9330am			
1500	1600		USA, WBOH Newport NC	5920am			
1500	1600		USA, WEWN Vandiver AL	15855as			
1500	1600		USA, WHRA Greenbush ME	15195va			
1500	1600	Sat/Sun	USA, WHRI Cypress Creek SC	9840na			
				11785na			
1500	1600		USA, WINB Red Lion PA	13570am			
1500	1600		USA, WRMI Miami FL	9955na			
1500	1600		USA, WTJC Newport NC	9370na			
1500	1600		USA, WWCR Nashville TN	7465na	9980na		
				13845na	15825na		
1500	1600		USA, WWRB Manchester TN	9385va			
1500	1600		USA, WYFR/Family Radio Worldwide	6280as			
				11830na	11910na	17795ca	
1500	1600		Zambia, CVC Intl/Christian Voice	6065af			
				13590af			
1505	1557		Canada, R Canada International	9515as			
				17720as	11675as		
1515	1545	mtwhf	Swaziland, Trans World Radio	6065af			
1515	1545	smtwhf	Swaziland, Trans World Radio	4760af			
1530	1558		Vatican City, Vatican Radio	13765eu	15235eu		
1530	1600		Germany, Adventist World Radio Europe				
				15225as			
1530	1600		Iran, Voice of the Islamic Rep of Iran	7370as			
				9635af			
1530	1600		Mongolia, Voice of Mongolia	12085as			
1530	1600		Sweden, Radio Sweden	11590va			
1530	1600	Sun	UK, Bible Voice BC	13590me			
1530	1600	ha	UK, Bible Voice BC	15680as			
1530	1600	mtwhf	UK, Sudan Radio Service	9840af			
1540	1600	mtwhf	UK, Bible Voice BC	13590me			
1545	1600	Sat	UK, Bible Voice BC	13590me			
1551	1600	DRM	New Zealand, Radio NZ International	6170pa			
1551	1600		New Zealand, Radio NZ International	7145pa			

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

Start	End	Days	Station	Freq	Freq	Freq	Freq
1600	1615		Pakistan, Radio Pakistan	9380va	11570va		
				15625af			
1600	1615	twha	UK, Bible Voice BC	13590me			
1600	1627		Czech Rep, Radio Prague	5930eu	17485af		
1600	1628		Vietnam, Voice of Vietnam	7220va	7280va		
				9550va	9730va		
1600	1630		Guam, KSDA/ Adventist World Radio	11805as			
				11985as			
1600	1630		Iran, Voice of the Islamic Rep of Iran	7370as			
				9635af			
1600	1630		Myanmar, Myanma Radio	9730do			
1600	1630		Nigeria, Voice of Nigeria/Lagos	9690af			
1600	1630	Sat/Sun	Swaziland, Trans World Radio	6065af			
1600	1630		Yemen, Rep of Yemen Radio	9780me			
1600	1645	Sun	Germany, Pan American BC	13830me			
1600	1645		USA, WYFR/Family Radio Worldwide	11830na			
				11865na			
1600	1657		Canada, R Canada International	9515as			
1600	1657		China, China Radio International	6100af			
				6180me	9570af	9760me	11900af
				11940eu	11965eu	13760eu	
1600	1658		Germany, Deutsche Welle	6170as	9540as		
				15640as			
1600	1659		Finland, Overcomer Ministries	9595me			
1600	1700		Anguilla, Worldwide Univ Network	11775am			
1600	1700		Australia, CVC International	13635as			
1600	1700		Australia, Radio Australia	5995va	6080va		
				7240as	9475va	9710pa	11660pa
1600	1700	Sat	Canada, CBC NQ SW Service	9625na			
1600	1700		Canada, CFVP Calgary AB	6030na			
1600	1700		Canada, CKZN St John's NF	6160na			
1600	1700		Canada, CKZU Vancouver BC	6160na			
1600	1700	DRM	Canada, R Canada International	9800na			

Start	End	Days	Station	Freq	Freq	Freq	Freq
1600	1700		Costa Rica, Worldwide Univ Network	11870va			
				13750va			
1600	1700		Egypt, Radio Cairo	12170af			
1600	1700		Ethiopia, Radio Ethiopia	7165af	9560af		
1600	1700		France, Radio France International	15605af			
				17605af			
1600	1700		Italy, IRRS	9825af			
1600	1700		Malaysia, RTM/Traxx FM	7295as			
1600	1700	DRM	New Zealand, Radio NZ International	6170pa			
1600	1700		New Zealand, Radio NZ International	7145pa			
1600	1700		Nigeria, Radio Nigeria/Kaduna	4770do			
1600	1700		North Korea, Voice of Korea	9990va	11545va		
1600	1700	vl	Papua New Guinea, Wantok R. Light	7325va			
1600	1700		Russia, Voice of Russia	4975me	6070as		
				7350as	9405as	9890eu	11985va
				12055as	13855va		
1600	1700	vl	Rwanda, Radio Rwanda	6055do			
1600	1700	vl	Slovakia, Miraya FM Radio	9825af			
1600	1700	vl	Solomon Islands, SIBC	5020do	9545al		
1600	1700		South Korea, KBS World Radio	9515eu			
1600	1700		Taiwan, R Taiwan International	11550as			
				15515as			
1600	1700		Uganda, Dunamis Shortwave	4750af			
1600	1700		UK, BBC World Service	3255af	5975as		
				6190af	9625as	11920as	12095va
				15400af	15420af	17640af	17795af
				17830af	21470af		
1600	1700	Sat/Sun	UK, BBC World Service	7380af			
1600	1700	fs	UK, Bible Voice BC	13590me			
1600	1700		USA, American Forces Radio	4319usb			
				5446usb	5765usb	6350usb	7811usb
				10320usb	12133usb	13362usb	
1600	1700		USA, Voice of America	4930af	6080af		
				12080va	13600va	13615va	15455va
				15580af	17895va		
1600	1700	Sun	USA, WBCQ Monticello ME	15420am	17495am		
1600	1700		USA, WBCQ Monticello ME	9330am			
1600	1700		USA, WBOH Newport NC	5920am			
1600	1700		USA, WEWN Vandiver AL	15855as			
1600	1700		USA, WHRA Greenbush ME	17520af			
1600	1700		USA, WHRI Cypress Creek SC	9495am			
				9840na			
1600	1700		USA, WINB Red Lion PA	13570am			
1600	1700		USA, WRMI Miami FL	9955am			
1600	1700		USA, WTJC Newport NC	9370na			
1600	1700		USA, WWCR Nashville TN	9980na	12160na		
				13845na	15825na		
1600	1700		USA, WWRB Manchester TN	9385va	12180va		
1600	1700	Sun	USA, WWRB Manchester TN	11920af			
1600	1700		USA, WYFR/Family Radio Worldwide	6085ca			
				13695na	17795ca	18980va	21525af
				21455va			
1600	1700		Zambia, CVC Intl/Christian Voice	4965af			
				13590af			
1615	1629		Vatican City, Vatican Radio	5885eu	7250eu		
				9645eu	15595eu		
1615	1630	h	UK, Bible Voice BC	13590me			
1615	1645	mtwhf	Swaziland, Trans World Radio	6130af			
1615	1700	Sun	UK, BBC World Service	11860va			
1615	1700	ta	UK, Bible Voice BC	13590me			
1630	1645	h	UK, Bible Voice BC	13590me			
1630	1657		Slovakia, R Slovakia International	5920eu			
				6055eu			
1630	1700		Guam, KSDA/ Adventist World Radio	6155as			
1630	1700		Nigeria, Voice of Nigeria/Lagos	15120af			
1630	1700	Sat/Sun	Swaziland, Trans World Radio	6130af			
1630	1700	Sat	UK, BBC World Service	11860af			
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930eu			
1645	1700		Tajikistan, Tajik Radio	7245as			

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

Start	End	Days	Station	Freq	Freq	Freq	Freq
1700	1705		Canada, R Canada International	9515as			
1700	1705	DRM	Canada, R Canada International	9800na			
1700	1715	t/ vl	UK, Bible Voice BC	13590me			
1700	1720	twhfa	Moldova, Radio PMR/Pridnestrovie	6235eu			
1700	1727		Czech Rep, Radio Prague	5930eu	17485af		
1700	1730		Jordan, Radio Jordan	11690na			
1700	1730	DRM	Romania, R Romania International	7460eu			
1700	1730	Sat	UK, Bible Voice BC	13590me			
1700	1730		USA, Voice of America	6080af	11835af		
				15580af			
1700	1730	Sat	USA, WRMI Miami FL	15650af			
1700	1740	f	Moldova, Radio PMR/Pridnestrovie	6235eu			
1700	1745		UK, BBC World Service	6005af	9410af		
1700	1756		Romania, R Romania International	9535eu			
				11735eu			
1700	1757		China, China Radio International	6100af			
				6145eu	7130as	7265me	7315me

Start	Stop	Days	Station	Frequencies
				7335eu 9570af 9595eu 11900af 11940eu 13760eu
1700	1757		Netherlands, Radio Netherlands	5955eu
1700	1759		Poland, Polish Radio	7140eu 7265eu
1700	1800		Anguilla, Worldwide Univ Network	11775am
1700	1800		Australia, CVC International	13635as
1700	1800		Australia, Radio Australia	5995va 6080va 9475as 9580va 9710af 11880as
1700	1800	Sat	Canada, CBC NQ SW Service	9625na
1700	1800		Canada, CFVP Calgary AB	6030na
1700	1800		Canada, CKZN St John's NF	6160na
1700	1800		Canada, CKZU Vancouver BC	6160na
1700	1800		Costa Rica, Worldwide Univ Network	11870va 13750va
1700	1800		Egypt, Radio Cairo	12170af
1700	1800		Equatorial Guinea, Radio Africa	15190af
1700	1800		Equatorial Guinea, Radio Africa	15190af
1700	1800		Italy, IRRS	9825af
1700	1800		Malaysia, RTM/Traxx FM	7295as
1700	1800	DRM	New Zealand, Radio NZ International	6170pa
1700	1800		New Zealand, Radio NZ International	7145pa
1700	1800		Nigeria, Radio Nigeria/Kaduna	4770do
1700	1800		Nigeria, Voice of Nigeria/Lagos	15120af
1700	1800	vl	Papua New Guinea, Wantok R. Light	7325va
1700	1800	Sat	Russia, Voice of Russia	9820eu 9890eu
1700	1800		Russia, Voice of Russia	4975me 7350as 9405as 11510af 11985af
1700	1800	Sat/Sun	Russia, Voice of Russia	6000eu 7320eu 7340eu
1700	1800	vl	Rwanda, Radio Rwanda	6055do
1700	1800	vl	Slovakia, Miraya FM Radio	9825af
1700	1800	vl	Solomon Islands, SIBC	5020eu 9545al
1700	1800		South Africa, Channel Africa	15235af
1700	1800		Swaziland, Trans World Radio	3200af 9500af
1700	1800		Taiwan, R Taiwan International	11705af 15690af
1700	1800		Uganda, Dunamis Shortwave	4750af
1700	1800		UK, BBC World Service	3255af 5975as 6190af 6195va 7380af 9625as 11955as 12095af 13865va 15400af 17795af 17830af
1700	1800	fas	UK, Bible Voice BC	9430me 13590me
1700	1800		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
1700	1800	Sat/Sun	USA, Voice of America	15675af
1700	1800		USA, WBCQ Monticello ME	9330am 17495am
1700	1800		USA, WBOH Newport NC	5920am
1700	1800		USA, WEWN Vandiver AL	15855as
1700	1800		USA, WHRA Greenbush ME	17520af
1700	1800		USA, WHRI Cypress Creek SC	9495am 9840na
1700	1800		USA, WINB Red Lion PA	13570am
1700	1800	smtwhf	USA, WMLK Bethel PA	9265va
1700	1800		USA, WRMI Miami FL	9955am
1700	1800		USA, WTJC Newport NC	9370na
1700	1800		USA, WWCR Nashville TN	9980na 12160na 13845na 15825na
1700	1800	Sun	USA, WWRB Manchester TN	11920af
1700	1800		USA, WWRB Manchester TN	9385va 12180va
1700	1800		USA, WYFR/Family Radio Worldwide	13690na 17795ca 18980va 21455va
1700	1800		Zambia, CVC Intl/Christian Voice	4965af 13590af
1720	1740	Sat/Sun	USA, Voice of America	4930af 13755af 15775af
1730	1757		Vatican City, Vatican Radio	11625af 12765af 15570af
1730	1800		Bulgaria, Radio Bulgaria	7200eu 9400eu
1730	1800		Guam, KSDA/ Adventist World Radio	9980as
1730	1800		Swaziland, Trans World Radio	9500af
1730	1800	whf	Sweden, Radio Sweden	6065va
1730	1800	mtwhf	UK, Sudan Radio Service	9840af
1730	1800		USA, Voice of America	5980va 6080af 6110va 9570va 11805va 15410af 15580af
1730	1800	mtwhf	USA, Voice of America	4930af 13755af 15775af
1745	1800		Bangladesh, Bangla Betar	7185as
1745	1800		India, All India Radio	7410eu 9445af 9950eu 11620eu 11935af 13605af 15075af 15155af 17670af

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

Start	Stop	Days	Station	Frequencies
1800	1809		Tanzania, Tanzania Broadcasing Corp	11735af
1800	1815	Sun	UK, Bible Voice BC	13590me
1800	1815	Sat	UK, Bible Voice BC	11875me
1800	1828		Vietnam, Voice of Vietnam	9765eu
1800	1830	w	Austria, Adventist World Radio Europe	15315af
1800	1830		Nigeria, Radio, National Svc/Abuja	7275do
1800	1830		South Africa, AWR Africa	3215af 3345af 9610af
1800	1830		UK, BBC World Service	5975as 11955as
1800	1830	Sat	UK, Bible Voice BC	9430me 13590me
1800	1830	Sun	UK, Bible Voice BC	6130va
1800	1830		USA, Voice of America	6080af 15410af 15580af 17865af
1800	1830	Sat/Sun	USA, Voice of America	4930af
1800	1845	Sat	UK, Bible Voice BC	6130eu
1800	1850	DRM	New Zealand, Radio NZ International	6170pa
1800	1850		New Zealand, Radio NZ International	7145pa
1800	1857		China, China Radio International	7120eu 9600eu 13760eu
1800	1857		Netherlands, Radio Netherlands	6020af 11660af 15535af
1800	1859		Canada, R Canada International	9530af 11765af 17735af 17810af
1800	1900		Anguilla, Worldwide Univ Network	11775am
1800	1900		Australia, Radio Australia	6080va 7240as 9475va 9580as 9710as 11880as
1800	1900		Bangladesh, Bangla Betar	7185eu
1800	1900		Canada, CFVP Calgary AB	6030na
1800	1900		Canada, CKZN St John's NF	6160na
1800	1900		Canada, CKZU Vancouver BC	6160na
1800	1900		Costa Rica, Worldwide Univ Network	11870va 13750va
1800	1900		Equatorial Guinea, Radio Africa	15190af
1800	1900		Equatorial Guinea, Radio Africa	15190af
1800	1900		India, All India Radio	7410eu 9445af 9950eu 11620eu 11935af 13605af 15075af 15155af 17670af
1800	1900	fas	Italy, IRRS	7290va
1800	1900		Kuwait, Radio Kuwait	11990na
1800	1900		Malaysia, RTM/Traxx FM	7295as
1800	1900		Netherlands, Radio Netherlands	7395af
1800	1900		Nigeria, Radio Nigeria/Kaduna	4770do
1800	1900		Nigeria, Voice of Nigeria/Lagos	15120af
1800	1900		North Korea, Voice of Korea	7570eu 12015eu
1800	1900	vl	Papua New Guinea, Wantok R. Light	7325va
1800	1900		Russia, Voice of Russia	9480eu 9745af 9850af 9890eu
1800	1900	vl	Rwanda, Radio Rwanda	6055do
1800	1900	fas	Slovakia, European Gospel Radio	7290af
1800	1900	vl	Solomon Islands, SIBC	5020do 9545al
1800	1900		South Korea, KBS World Radio	7275eu
1800	1900		Swaziland, Trans World Radio	3200af 9500af
1800	1900		Taiwan, R Taiwan International	3965eu
1800	1900		Uganda, Dunamis Shortwave	4750af
1800	1900		UK, BBC World Service	3255af 5895va 5995as 6190af 6195va 7380af 9485as 12095af 13865va 15400af 17795af 17830af
1800	1900	Sun	UK, Bible Voice BC	9430me
1800	1900		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
1800	1900		USA, WBCQ Monticello ME	7415am 9330am 17495am
1800	1900		USA, WBOH Newport NC	5920am
1800	1900		USA, WEWN Vandiver AL	15855as
1800	1900		USA, WHRA Greenbush ME	17690af
1800	1900	mtwhf	USA, WHRI Cypress Creek SC	17520af
1800	1900	Sat/Sun	USA, WHRI Cypress Creek SC	9495am
1800	1900		USA, WHRI Cypress Creek SC	9840na
1800	1900		USA, WINB Red Lion PA	13570am
1800	1900	smtwhf	USA, WMLK Bethel PA	9265va
1800	1900		USA, WRMI Miami FL	9955am
1800	1900		USA, WTJC Newport NC	9370na
1800	1900		USA, WWCR Nashville TN	9980na 12160na 13845na 15825na
1800	1900	Sun	USA, WWRB Manchester TN	11920af
1800	1900		USA, WWRB Manchester TN	9385va 12180va
1800	1900		USA, WYFR/Family Radio Worldwide	13615na 13690na 17795ca 17845af 18980va
1800	1900		Yemen, Rep of Yemen Radio	9780me
1800	1900		Zambia, CVC Intl/Christian Voice	4965af 13590af
1830	1857		Slovakia, R Slovakia International	5920eu 6055eu
1830	1900		Serbia, International Radio Serbia	6100eu 7200eu
1830	1900		Turkey, Voice of Turkey	9785eu
1830	1900		UK, BBC World Service	6005af 9410af
1830	1900	f	UK, Bible Voice BC	9430me
1830	1900	Sun	UK, Bible Voice BC	6130eu
1830	1900		USA, Voice of America	4930af 6080af

		6110va	9520va	9885af	11755va	
		11805va	15410af	15580af	17895af	
1845	1900	mtwhfa	Albania, Radio Tirana	7430eu	13640eu	
1845	1900	Sun	UK, Bible Voice BC	11830va		
1851	1900	DRM	New Zealand, Radio NZ International	9890pa		
1851	1900		New Zealand, Radio NZ International	9615pa		

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1925		Turkey, Voice of Turkey	9785eu		
1900	1928		Vietnam, Voice of Vietnam	7280va	9730va	
1900	1930		Germany, Deutsche Welle	9565af	11795af	
			17860af			
1900	1930	Sun	UK, Bible Voice BC	6130eu	13710af	
1900	1935	DRM	New Zealand, Radio NZ International	9890pa		
1900	1945		India, All India Radio	7410eu	9445af	
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1900	1945		USA, WYFR/Family Radio Worldwide	6085ca		
1900	1950		New Zealand, Radio NZ International	9615pa		
1900	1957		China, China Radio International	7295va		
			9435va			
1900	1957		Netherlands, Radio Netherlands	5905af		
			7425af	11660af	15335af	15535af
1900	2000		Anguilla, Worldwide Univ Network	11775am		
1900	2000		Australia, Radio Australia	6080va	7240as	
			9500va	9580va	9710as	11880as
1900	2000		Canada, CFVP Calgary AB	6030na		
1900	2000		Canada, CKZN St John's NF	6160na		
1900	2000		Canada, CKZU Vancouver BC	6160na		
1900	2000		Costa Rica, Worldwide Univ Network	11870va		
			13750va			
1900	2000		Egypt, Radio Cairo	9300af		
1900	2000		Equatorial Guinea, Radio Africa	15190af		
1900	2000		Finland, Overcomer Ministries	6060eu		
1900	2000	fas	Italy, IRRS	7290va		
1900	2000		Kuwait, Radio Kuwait	11990na		
1900	2000		Malaysia, RTM/Traxx FM	7295as		
1900	2000		Netherlands, Radio Netherlands	7395af		
1900	2000		Nigeria, Radio Nigeria/Kaduna	4770do		
1900	2000		Nigeria, Voice of Nigeria/Lagos	15120af		
1900	2000		North Korea, Voice of Korea	7100af	9975va	
			11910af	11535va		
1900	2000		Papua New Guinea, National BC	4890do		
1900	2000	vl	Papua New Guinea, Wantok R. Light	7325va		
1900	2000		Russia, Voice of Russia	7310eu	7195eu	
			7310eu			
1900	2000	vl	Rwanda, Radio Rwanda	6055do		
1900	2000	fas	Slovakia, European Gospel Radio	7290af		
1900	2000	vl	Solomon Islands, SIBC	5020do		
1900	2000	vl	South Africa, Channel Africa	3345af		
1900	2000		South Africa, SA Radio League	3215af		
1900	2000		Swaziland, Trans World Radio	3200af		
			9500af			
1900	2000		Thailand, Radio Thailand	7155eu		
1900	2000	vl	Uganda, UBC Radio	4976do	5026do	
1900	2000		UK, BBC World Service	3255af	5875va	
			5995as	6005af	6190af	9410af
			9485as	12095af	15400af	17795af
			17830af			
1900	2000		Ukraine, R Ukraine International	7490eu		
1900	2000		USA, American Forces Radio	4319usb		
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
1900	2000		USA, KJES Vado NM	15385na		
1900	2000		USA, Voice of America	4930af	6080af	
			7480af	9670va	9885af	15410af
			15580af	17895af		
1900	2000		USA, WBCQ Monticello ME	7415am	9330am	
			17495am			
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Vandiver AL	17595af		
1900	2000		USA, WHRA Greenbush ME	17690af		
1900	2000		USA, WHRI Cypress Creek SC	9495am		
			9840na			
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000	smtwhf	USA, WMLK Bethel PA	9265va		
1900	2000		USA, WRMI Miami FL	9955am		
1900	2000		USA, WTJC Newport NC	9370na		
1900	2000		USA, WWCR Nashville TN	9980na	12160na	
			13845na	15825na		
1900	2000		USA, WWRB Manchester TN	9385va	12180va	
1900	2000		USA, WYFR/Family Radio Worldwide	3230af		
			13615na	13690ca	17795af	17845eu
			18930va	18980va		
1900	2000		Zambia, CVC Intl/Christian Voice	4965af		
			13590af			
1930	2000	fas	Germany, Pan American BC	9515va		
1930	2000		Iran, Voice of the Islamic Rep of Iran	6205eu		

		7205eu	7260as	9800af	9925af	
1936	2000	DRM	New Zealand, Radio NZ International	11675pa		
1945	2000	DRM	Vatican City, Vatican Radio	9800af		
1950	2000		Vatican City, Vatican Radio	5885eu	7250eu	
			9645eu			
1951	2000		New Zealand, Radio NZ International	11725pa		

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2015	Sun	Germany, Pan American BC	9515va		
2000	2019		Vatican City, Vatican Radio	5885eu	7250eu	
			9645eu			
2000	2019	DRM	Vatican City, Vatican Radio	9800na		
2000	2027		Czech Rep, Radio Prague	5930eu	11600eu	
2000	2027		Iran, Voice of the Islamic Rep of Iran	6205eu		
			7205eu	7260as	9800af	9925af
2000	2027		Vatican City, Vatican Radio	7365af	9755af	
			11625af			
2000	2030	mtwhfa	Albania, Radio Tirana	7460eu	13600na	
2000	2030		China, China Radio International	7160eu		
2000	2030		Egypt, Radio Cairo	9300af		
2000	2030	fa	Germany, Pan American BC	9515va		
2000	2030		South Africa, AWR Africa	9655af		
2000	2030		USA, Voice of America	4930af	4940af	
			6080af	15580af	17895af	
2000	2045		Swaziland, Trans World Radio	3200af		
2000	2045		USA, WYFR/Family Radio Worldwide	17750eu		
2000	2050		New Zealand, Radio NZ International	11725pa		
2000	2050	DRM	New Zealand, Radio NZ International	11675pa		
2000	2057		China, China Radio International	5960na		
			5985af	7190eu	7285eu	7295va
			9440va	9660eu		
2000	2057		Germany, Deutsche Welle	6150af	11795af	
			11865af	15205af		
2000	2057		Netherlands, Radio Netherlands	5905af		
			7425af	17810af		
2000	2059		Canada, R Canada International	11765af		
			13650af	15235af	17735af	
2000	2059		Finland, Overcomer Ministries	6060eu		
2000	2100		Anguilla, Worldwide Univ Network	11775am		
2000	2100		Australia, ABC NT Alice Springs	2310do		
			4835do			
2000	2100		Australia, ABC NT Katherine	2485do		
2000	2100		Australia, ABC NT Tennant Creek	2325do		
2000	2100	Sat/Sun	Australia, Radio Australia	6080va	7240as	
			12080as			
2000	2100		Australia, Radio Australia	9500va	11650as	
			11660pa	11880as		
2000	2100		Belarus, Radio Minsk	7105eu	7360eu	
			7390eu			
2000	2100		Canada, CFVP Calgary AB	6030na		
2000	2100		Canada, CKZN St John's NF	6160na		
2000	2100		Canada, CKZU Vancouver BC	6160na		
2000	2100		Costa Rica, Worldwide Univ Network	13750va		
2000	2100		Equatorial Guinea, Radio Africa	15190af		
2000	2100		Germany, The Overcomer Ministries	5995eu		
2000	2100		Indonesia, Voice of Indonesia	9525al		
			11785pa	15150as		
2000	2100		Kuwait, Radio Kuwait	11990na		
2000	2100	vl	Liberia, ELWA	4760do		
2000	2100		Malaysia, RTM/Traxx FM	7295as		
2000	2100		Netherlands, Radio Netherlands	6020af		
2000	2100		Nigeria, Radio Nigeria/Kaduna	4770do		
2000	2100		Nigeria, Voice of Nigeria/Lagos	15120af		
2000	2100		Papua New Guinea, National BC	4890do		
2000	2100	vl	Papua New Guinea, Wantok R. Light	7325va		
2000	2100		Russia, Voice of Russia	7195eu	9890eu	
2000	2100	vl	Rwanda, Radio Rwanda	6055do		
2000	2100	vl	South Africa, Channel Africa	3345af		
2000	2100	mtwhf	Spain, Radio Exterior Espana	9665eu	11625af	
2000	2100	vl	Uganda, UBC Radio	4976do	5026do	
2000	2100		UK, BBC World Service	3255af	5875va	
			6005af	6190af	9410af	12095af
			13820af	15400af	17830af	
2000	2100		USA, American Forces Radio	4319usb		
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
2000	2100		USA, WBCQ Monticello ME	7415am	9330am	
			17495am			
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Vandiver AL	17595af		
2000	2100	mtwhf	USA, WHRA Greenbush ME	7520va		
2000	2100	Sat/Sun	USA, WHRA Greenbush ME	11885va		
2000	2100	asmtwh	USA, WHRI Cypress Creek SC	9495am		
2000	2100	f	USA, WHRI Cypress Creek SC	17650af		
2000	2100	Sat/Sun	USA, WHRI Cypress Creek SC	15665na		
2000	2100	mtwhf	USA, WHRI Cypress Creek SC	11785na		
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100	smtwhf	USA, WMLK Bethel PA	9265va		

Start	Stop	Days	Station	Frequencies
2000	2100		USA, WRMI Miami FL	9955am
2000	2100		USA, WTJC Newport NC	9370na
2000	2100		USA, WWCR Nashville TN	9980na 12160na 13845na 15825na
2000	2100	Sun	USA, WWRB Manchester TN	11920af
2000	2100		USA, WWRB Manchester TN	9385va 12180va
2000	2100		USA, WYFR/Family Radio	13615na 17725sa 17795ca 17845af 18980af
2000	2100		Zambia, CVC Intl/Christian Voice	4965af 13590af
2005	2100		Syria, Radio Damascus	9330eu 12085eu
2030	2045		Thailand, Radio Thailand	9680eu
2030	2056		Romania, R Romania International	9515eu 11810eu 11940na 15465na
2030	2058		Vietnam, Voice of Vietnam	7220va 7280va 9550va 9730va
2030	2100		Cuba, Radio Havana Cuba	9505va 11760va
2030	2100		Netherlands, Radio Netherlands	7395af
2030	2100		Sweden, Radio Sweden	7395af 7420pa
2030	2100		Turkey, Voice of Turkey	7170va
2030	2100		USA, Voice of America	4930af 6080af 7555as 15580af 17895af
2030	2100	Sat/Sun	USA, Voice of America	11720af
2045	2100		India, All India Radio	7410eu 9445eu 9910pa 9950eu 11620va 11715pa
2051	2100		New Zealand, Radio NZ International	15720pa
2051	2100	DRM	New Zealand, Radio NZ International	13840pa

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

Start	Stop	Days	Station	Frequencies
2100	2125		Turkey, Voice of Turkey	7170pa
2100	2127		China, China Radio International	11640af 13630af
2100	2130		Australia, ABC NT Katherine	2485do
2100	2130		Australia, ABC NT Tennant Creek	2325do
2100	2130		Austria, Adventist World Radio Europe	11955af
2100	2130	Sat	Canada, CBC NQ SW Service	9625na
2100	2130		Cuba, Radio Havana Cuba	9505va 11760va
2100	2130		Nigeria, Radio, National Svc/Abuja	7275do
2100	2130		Serbia, International Radio Serbia	6100eu 7200eu
2100	2130		South Africa, AWR Africa	11955af
2100	2130		South Korea, KBS World Radio	3955eu
2100	2145		USA, WYFR/Family Radio Worldwide	13615na 17795ca 18980va
2100	2157		China, China Radio International	5960eu 6135eu 7190eu 7285eu 7325af 9600eu
2100	2200		Anguilla, Worldwide Univ Network	11775am
2100	2200		Australia, ABC NT Alice Springs	2310do 4835do
2100	2200		Australia, Radio Australia	9500as 9660as 11650pa 11660pa 11695as 12080as 13630as 15515as
2100	2200		Belarus, Radio Minsk	7105eu 7390eu
2100	2200		Bulgaria, Radio Bulgaria	5900eu 9700eu
2100	2200		Canada, CFVP Calgary AB	6030na
2100	2200		Canada, CKZN St John's NF	6160na
2100	2200		Canada, CKZU Vancouver BC	6160na
2100	2200		Costa Rica, Worldwide Univ Network	13750va
2100	2200		Equatorial Guinea, Radio Africa	15190af
2100	2200		Germany, Deutsche Welle	9735af 11865af 15205af
2100	2200		Germany, The Overcomer Ministries	5995eu
2100	2200		Guyana, Voice of Guyana	3291do 5950do
2100	2200		India, All India Radio	7410eu 9445eu 9950eu 11620eu
2100	2200	vl	Liberia, ELWA	4760do
2100	2200		Malaysia, RTM/Traxx FM	7295as
2100	2200		New Zealand, Radio NZ International	15720pa
2100	2200	DRM	New Zealand, Radio NZ International	13840pa
2100	2200		Nigeria, Radio Nigeria/Kaduna	4770do
2100	2200		Nigeria, Voice of Nigeria/Lagos	7255af
2100	2200		North Korea, Voice of Korea	7570eu 12015eu
2100	2200		Papua New Guinea, National BC	4890do
2100	2200	vl	Papua New Guinea, Wantok R. Light	7325va
2100	2200	vl	South Africa, Channel Africa	3345af
2100	2200	Sat/Sun	Spain, Radio Exterior Espana	9840va
2100	2200		Syria, Radio Damascus	9330eu 12085eu
2100	2200		UK, BBC World Service	3255af 3915as 5875va 5905as 6005af 6190af 6195as 7120af 12095af 15400af
2100	2200		Ukraine, R Ukraine International	7510eu
2100	2200		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
2100	2200		USA, Voice of America	6080af 7555as 15580af
2100	2200		USA, WBCQ Monticello ME	5110am 7415am 17495am
2100	2200		USA, WBOH Newport NC	5920am
2100	2200		USA, WEWN Vandiver AL	17595af
2100	2200		USA, WHRA Greenbush ME	11885va
2100	2200	Sat/Sun	USA, WHRI Cypress Creek SC	15665na
2100	2200	mtwhf	USA, WHRI Cypress Creek SC	11785na
2100	2200		USA, WHRI Cypress Creek SC	7385am
2100	2200		USA, WINB Red Lion PA	13570am
2100	2200	smtwhf	USA, WMLK Bethel PA	9265va
2100	2200		USA, WRMI Miami FL	9955am
2100	2200		USA, WTJC Newport NC	9370na
2100	2200		USA, WWCR Nashville TN	7465na 9980na 12160na 13845na
2100	2200	Sun	USA, WWRB Manchester TN	11920af
2100	2200		USA, WWRB Manchester TN	9385va 12180va
2100	2200		USA, WYFR/Family Radio Worldwide	3230af 11565eu 17845af
2100	2200		Zambia, CVC Intl/Christian Voice	4965af
2115	2200		Egypt, Radio Cairo	11550eu
2130	2157		Czech Rep, Radio Prague	9410af 11600na
2130	2200		Australia, ABC NT Katherine	5025do
2130	2200		Australia, ABC NT Tennant Creek	4910do
2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na
2130	2200		Guam, KSDA/ Adventist World Radio	11850as
2130	2200		Lithuania, Mighty KBC Radio	6055eu
2130	2200		Netherlands, Radio Netherlands	7420pa
2130	2200		Sweden, Radio Sweden	6065va 7420pa

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

Start	Stop	Days	Station	Frequencies
2200	2210		Syria, Radio Damascus	9330eu 12085eu
2200	2220		Japan, NHK World/Radio Japan	13640as
2200	2229		Lithuania, Mighty KBC Radio	6055eu
2200	2230		India, All India Radio	9910pa 11620pa 11715pa
2200	2230		Papua New Guinea, National BC	4890do
2200	2240		New Zealand, Radio NZ International	15720pa
2200	2240	DRM	New Zealand, Radio NZ International	13840pa
2200	2245		Egypt, Radio Cairo	11550eu
2200	2245		USA, WYFR/Family Radio Worldwide	15770af
2200	2255		Turkey, Voice of Turkey	6195va
2200	2256		Romania, R Romania International	7185eu 9675eu 9790na 11940na
2200	2257		China, China Radio International	7175eu
2200	2300		Anguilla, Worldwide Univ Network	6090am
2200	2300		Australia, ABC NT Alice Springs	2310do 4835do
2200	2300		Australia, ABC NT Katherine	5025do
2200	2300		Australia, ABC NT Tennant Creek	4910do
2200	2300		Australia, Radio Australia	11840va 12010va 13630pa 15230va 15240pa 15515as 17785pa
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na
2200	2300		Canada, CFVP Calgary AB	6030na
2200	2300		Canada, CKZN St John's NF	6160na
2200	2300		Canada, CKZU Vancouver BC	6160na
2200	2300		China, China Radio International	9590as
2200	2300		Costa Rica, Worldwide Univ Network	13750va
2200	2300		Equatorial Guinea, Radio Africa	15190af
2200	2300		Guyana, Voice of Guyana	3291do
2200	2300	vl	Liberia, ELWA	4760do
2200	2300		Malaysia, RTM/Traxx FM	7295as
2200	2300		Nigeria, Radio Nigeria/Kaduna	4770do
2200	2300		Nigeria, Voice of Nigeria/Lagos	7255af
2200	2300	vl	Papua New Guinea, Wantok R. Light	7325va
2200	2300		Taiwan, R Taiwan International	9355eu
2200	2300		UK, BBC World Service	5905as 5975as 6005af 6195as 9740as 12095af 15400af
2200	2300		USA, American Forces Radio	4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
2200	2300		USA, Voice of America	6105va 7120va 7460va 7555as 9415va 11725va 15185va
2200	2300	mtw	USA, WBCQ Monticello ME	17495am
2200	2300		USA, WBCQ Monticello ME	5110am 7415am 9330am
2200	2300		USA, WBOH Newport NC	5920am
2200	2300		USA, WEWN Vandiver AL	15665af
2200	2300		USA, WHRA Greenbush ME	11855va
2200	2300	Sun	USA, WHRI Cypress Creek SC	9615na
2200	2300	mtwhfa	USA, WHRI Cypress Creek SC	11785na
2200	2300		USA, WHRI Cypress Creek SC	7385am
2200	2300		USA, WINB Red Lion PA	9265am
2200	2300		USA, WRMI Miami FL	9955am
2200	2300		USA, WTJC Newport NC	9370na
2200	2300		USA, WWCR Nashville TN	5070na 7465na 9980na 13845na

2200	2300		USA, WWRB Manchester TN	6890va	9385va	
			12180va			
2200	2300		USA, WYFR/Family Radio Worldwide		11740na	
2200	2300		Zambia, CVC Intl/Christian Voice		4965af	
2230	2257		Czech Rep, Radio Prague	7345na	9415na	
2230	2300		Guam, KSDA/ Adventist World Radio		15320as	
2230	2300		Papua New Guinea, National BC		9675do	
2230	2300	DRM	Sweden, Radio Sweden	9800na		
2230	2300		USA, Voice of America	9570va	11705va	
			15145va			
2241	2300		New Zealand, Radio NZ International		13840pa	
2241	2300	DRM	New Zealand, Radio NZ International		15720pa	
2245	2300		India, All India Radio	9705eu	9950as	
			11620as	11645as	13605as	

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000		Anguilla, Worldwide Univ Network		6090am	
2300	0000		Australia, ABC NT Alice Springs		2310do	
			4835do			
2300	0000		Australia, ABC NT Katherine 5025do			
2300	0000		Australia, ABC NT Tennant Creek		4910do	
2300	0000		Australia, Radio Australia	9660as	11840va	
			12010pa	12080pa	13690pa	15230va
			15240pa	15560va	17795va	
2300	0000		Australia, Radio Australia	9660as	11840as	
			12010va	12080pa	13690pa	15230va
			17785pa	17795va		
2300	0000		Bulgaria, Radio Bulgaria	9700na	11700na	
2300	0000	smtwhf	Canada, CBC NQ SW Service		9625na	
2300	0000		Canada, CFVP Calgary AB	6030na		
2300	0000		Canada, CKZN St John's NF 6160na			
2300	0000		Canada, CKZU Vancouver BC		6160na	
2300	0000		China, China Radio International		5915as	
			5990am	6145na	7180as	9460as
			11690as	11970ca		
2300	0000	DRM	China, China Radio International		9800ca	
2300	0000		Costa Rica, Worldwide Univ Network		13750va	
2300	0000		Cuba, Radio Havana Cuba	9505am	9550am	
2300	0000		Egypt, Radio Cairo	9280na		
2300	0000		Guyana, Voice of Guyana	3291do		
2300	0000		India, All India Radio	9950as	11645as	
			13605as			
2300	0000		Malaysia, RTM/Traxx FM	7295as		
2300	0000		New Zealand, Radio NZ International		13840pa	
2300	0000	DRM	New Zealand, Radio NZ International		15720pa	
2300	0000		Papua New Guinea, National BC		9675do	
2300	0000	vl	Papua New Guinea, Wantok R. Light		7325va	
2300	0000		Singapore, MediaCorp Radio		6150do	
2300	0000		UK, BBC World Service	3915as	5965as	
			6195as	9740as	9885as	11955as
			12010as			
2300	0000		USA, American Forces Radio		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
2300	0000		USA, Voice of America	6105va	7120va	
			7555va	9415va	9570va	11725va
			13755va	15145va	15185va	
2300	0000		USA, WBCQ Monticello ME	5110am	7415am	
			9330am			
2300	0000		USA, WBOH Newport NC	5920am		
2300	0000		USA, WEWN Vandiver AL	15665af		
2300	0000		USA, WHRA Greenbush ME	5850eu		
2300	0000	Sun	USA, WHRI Cypress Creek SC		9615na	
2300	0000	mtwhfa	USA, WHRI Cypress Creek SC		11785na	
2300	0000		USA, WHRI Cypress Creek SC		7315am	
2300	0000		USA, WINB Red Lion PA	9265am		
2300	0000		USA, WRMI Miami FL	9955am		
2300	0000		USA, WTJC Newport NC	9370na		
2300	0000		USA, WWCR Nashville TN	5070na	7465na	
			9980na	13845na		
2300	0000		USA, WWRB Manchester TN	6890va	9385va	
			12180va			
2300	0000		USA, WYFR/Family Radio Worldwide		15255sa	
			17750sa			
2300	0000		Zambia, CVC Intl/Christian Voice		4965af	
2300	2305	vl	Liberia, ELWA	4760do		
2300	2315		Nigeria, Radio Nigeria/Kaduna		4770do	
2300	2330		Australia, Radio Australia	15240pa		
2300	2330	w	USA, WBCQ Monticello ME	17495am		
2300	2345		USA, WYFR/Family Radio Worldwide		11740na	
2305	0000	twhfa	Canada, R Canada International		6100na	
2305	0000	Sun	Greece, Voice of Greece	7475eu	9420eu	
2315	2330	vl	Croatia, Croatian Radio	9925na		
2330	0000		Australia, Radio Australia	15415as	17750va	
2330	0000		Lithuania, Radio Vilnius	9875na		
2330	0000		UK, BBC World Service	9580as		
2330	0000		USA, Voice of America	7350va	9570va	
			13755va	15145va	15340va	
2330	2358		Vietnam, Voice of Vietnam	9840as	12020as	

Thunderbirds Use New VHF Frequencies

The airshow season has barely started and the first field reports of the season indicate that the US Air Force Thunderbirds are using at least two new VHF frequencies.

The first frequency, 139.800 MHz, is known as Victor-1 and utilizes the AM mode. I first suggested they might be using this frequency way back in our *MT 2006 Airshow Guide* (March 2006 *MT*).

The second, known as Victor-2, was observed on 148.850 MHz (AM). This one is a bit of surprise and could indicate that the T-bird Victor-2 frequency may be somewhat agile and could involve more than one frequency.

If you attend a future T-Bird show and note that 148.850 MHz is not active, you will need to turn on your Close Call™, Signal Stalker™, or Spectrum Sweeper™ technology to find Victor-2. I expect that the new 139.800 MHz assignment will remain stable for the time being.

I also suggest you should program the following two VHF frequencies/modes and watch for possible activation by the indicated units in the near future.

138.2500	Blue Angels (AM mode)
142.8000	Golden Knights (AM mode)

If you hear anything, please send us some email/snail mail and I will post it up on the *Milcom Monitoring Post Blog* (**http://mt-milcom.blogspot.com/**) for the rest of the monitoring community.

❖ UHF Frequencies Change at Boca Chica

Recently we received several frequency changes for the Naval Air Station (NAS) Key West/Boca Chica (KNQX) and the Tarpon Range. Here is that list of new frequencies, usage, and the frequencies they replaced.

250.850	Tarpon Range (ex-250.600)
270.850	Tarpon Range (ex-270.600)
275.650	Tarpon Range (ex-275.400)

USAF Thunderbirds Single AC Flight File

289.850	Key West Approach Control (ex-289.400)
302.350	Tarpon Range (ex-301.500)
309.400	NAS Detachment frequency (ex-309.000)
313.700	VHF Advisory (ex-313.200)
318.900	Tarpon Range (ex-318.500)
336.450	NAS Ground Control (ex-336.400)
340.250	NAS Tower (ex-340.100)
342.350	Tarpon Range (ex-342.600)
357.400	NAS Clearance Delivery (ex-355.600)
361.250	NAS Tower (ex-360.200)
365.700	NAS Detachment frequency (ex-377.500)
377.350	Tarpon Range (ex-342.200)

❖ More Frequency Changes and Updates

In this edition of *Milcom* it is time to present another round of aeronautical frequency changes and updates. We expect that robust changes will continue in all the aero bands, but right now it is more evident in the UHF aero spectrum. Our guess is that this is a result of the of the new 380-400 MHz LMR subband being created and other changes to the UHF spectrum that we do not fully understand at this point.

40.100	Akron-Canton Regional OH (KCAK) National Guard Operation (ex-41.100)
40.350	Polk AAF LA (KPOE) Metro
40.600	Lowe AHP AL (KLOR) Discrete (FM)
44.500	Polk AAF LA (KPOE) Selective Calling System frequency
118.150	Luke AFB AZ (KLUF) Departure Control
118.450	Hill AFB UT (KHIF) Range Control "Clover Control"
118.600	Akron-Canton Regional OH (KCAK) Approach/Departure Control
118.725	Whiteman AFB MO (KSZL) ATIS (ex-PTD assignment)
119.500	Bogue MCALF NC (KNJM) Single Frequency Approach
119.900	New Orleans Lakefront Airport (KNEW) Tower
119.900	Las Vegas-McCarren NV (KLAS) Tower
121.700	New Orleans Lakefront Airport (KNEW) Ground Control
121.850	Plattsburgh International (KPBG) Clearance Delivery (ex-121.700)
124.975	Hunter AAF GA (KSVN) Tower/PCL
126.500	Wright-Patterson AFB OH (KFFO) Approach/Departure Control
126.775	Trenton-Mercer NJ (KTTN) ATIS (ex-133.750)
127.075	Oceana NAS (Apollo Soucek Field) VA (KNTU) Tower
127.400	New Orleans Lakefront Airport (KNEW) Clearance Delivery
128.350	Kansas City ARTCC (St. Louis MO RCAG) (ex-119.625)

132.350	Anchorage ARTCC (Kotzebue AK RCAG) High Altitude Discrete
133.350	Fort Knox/Godman AAF KY ((KFTK) Tower (ex-126.800)
133.950	Las Vegas-McCarren NV (KLAS) Departure Control (ex-125.900)
134.100	Hill AFB UT (KHIF) Range Control "Clover Control"
134.775	NAS Jacksonville (KNIP) Base Operations
135.000	Polk AAF LA (KPOE) Metro
135.175	Springfield-Branson Regional MO (KSGF) ATIS (ex-119.050)
135.375	Hartsfield-Jackson GA (KATL) Departure Control for Runway 10/28
135.700	Hartsfield-Jackson GA (KATL) Departure Control for Runways 09L/27R AND 09R/27L
138.750	Laughlin AFB TX (KDLF) Ground Control (removed from service)
139.000	Marshall AAF KS (KFRI) Flight Following Primary
139.300	Maxwell AFB AL (KMXP) Pilot-to-Dispatcher (ex-121.850)
139.600	Wheeler-Sack NY (KGTB) Flight Following Advisories (R-5201) (ex-134.100)
140.400	Battle Creek MI (W.K. Kellogg Airport) (KBTL) 110FW/172FS Operations/Air-to-Air "Freebee Ops" (ex-140.450)
236.775	Cannon AFB NM (KCVS) Clearance Delivery (ex-378.800)
239.275	Cannon AFB NM (KCVS) Approach/Departure Control (ex-372.800)
247.000	Marshall AAF KS (KFRI) Flight Following Primary
251.500	Andrews AFB MD (KADW) Single Frequency Approach PTD (ex-386.800) [This frequency now being used by the Andrews 380-400 MHz TRS system.
257.800	Las Vegas-McCarren NV (KLAS) Tower
263.125	Luke AFB AZ (KLUF) Approach Control <Button 4>
267.400	Keesler AFB MS (KBIX) Metro (ex-344.6)
269.125	Cannon AFB NM (KCVS) Approach Control <Button 13> (ex-297.400)
270.250	Cannon AFB NM (KCVS) Tower <Button 3> (ex-348.400)
274.700	China Lake NAWS CA (KNID) Clearance Delivery
279.575	Laughlin AFB TX (KDLF) Tower (ex-392.000)
281.475	Cannon AFB NM (KCVS) Ground Controlled Approach <Button 17> (ex-252.900)
281.500	Anchorage ARTCC (Kotzebue AK RCAG) High Altitude Discrete
284.675	Kansas City ARTCC (St. Louis MO RCAG) (ex-290.250)
290.425	Mountain Home AFB ID (KMUO) Clearance Delivery (ex-285.65)
293.225	Cannon AFB NM (KCVS) Approach/Departure Control (ex-340.900)
296.700	Moody AFB GA Clearance Delivery (via Valdosta KVAD)

307.050 Lakehurst NAES (Maxfield Field) NJ (KNEL) Ground Control
307.175 Cannon AFB NM (KCVS) Departure Control <Button 4> (ex-397.200)
316.100 Anchorage ARTCC (Homer AK RCAG) High/Low Altitude
323.150 Luke AFB AZ (KLUF) South Approach Control
324.050 Nellis AFB - Tonopah Range Control NV "Nellis Control" (ex-338.600)
327.125 Wright-Patterson AFB OH (KFFO) Approach/Departure Control
336.400 Bogue MCALF NC (KNJM) Single Frequency Approach
341.300 Bogue MCALF NC (KNJM) Single Frequency Approach
342.500 Polk AAF LA (KPOE) Metro
352.100 Cannon AFB NM (KCVS) Approach Control <Button 12> (ex-358.300)
353.700 Las Vegas-McCarren NV (KLAS) Departure Control (ex-307.250)
353.975 Cannon AFB NM (KCVS) Single Frequency Approach Control <Button 14> (ex-259.300)
354.600 Columbus AFB MS (KCBM) Metro (ex-344.600)
360.700 Great Falls International Airport MT Approach/Departure Control (KGTF) (ex-259.100)
361.200 Bogue MCALF NC (KNJM) Single Frequency Approach
363.125 Luke AFB AZ (KLUF) Departure Control
363.600 Bogue MCALF NC (KNJM) Single Frequency Approach
363.800 Joint Base McGuire-Dix-Lakehurst NJ (KWRI) Approach/Departure Control
371.875 Akron-Canton Regional OH (KCAK) Approach/Departure Control (ex-226.400)
374.200 Polk AAF LA (KPOE) Selective Calling System frequency
379.150 Great Falls International Airport MT Approach/Departure Control (KGTF) (ex-259.100)

Some of the more interesting changes above are the Metro assignments that continue to move off of 344.600 MHz (see Keesler and Columbus AFB). DoD is definitely cleaning out this frequency with a plan to replace it with some sort of other service. Given the number of stations that have to be moved off that frequency, it must be a very high priority service to scatter all these Metro stations all over the spectrum.

❖ HF Military Frequencies

And finally this month, for those folks who say that the HF bands are dying and there is nothing to monitor, we present another installment of our HF military frequency list. These voice and digital frequencies have been logged recently from various points around the world. So if you want to monitor some HF milcom, give our list a try.

But, remember these are utility type communications. There are no schedules, weekdays will be busier than weekends, and propagation conditions from the transmitter to the target audience will determine what frequencies they use. At your location, propagation may not favor reception, so your mileage will vary on what you will hear on this list.

Stanag 4285 Data Transmissions
Australian Military   5363.6
Belgium Military   6345.0 6499.9
CanForce   6395.0
French Navy FUM-Papette, Tahiti 8625.0

USAF Thunderbirds at Mugu

German Military   3822.0   4057.0   4149.0   6502.4 6766.5
German Navy DHJ58-Glucksburg/Flensburg 4153.5 4536.6
German Navy DHJ59-Wilhelmshaven   4152.5 8335.3
Greece Military   5248.0 6495.0
Italian Military   6229.4   6313.6   6331.7   6345.0   6350.0   6362.4   6390.3   6410.5   6449.5   7389.0 10155.0
Italian Navy   3521.0   4115.6   4578.0   5097.0   5150.0   5237.5   9386.0 10155.0
NATO Naval Network   6992.0
Netherland Military 4205.0   5051.8   5162.0   6895.0
Norway Military   3857.0   3864.0   5229.5   5429.5 6407.0 8618.0
Portuguese Military 4307.8 4591.8 5850.0
Spanish Military   4279.0   5387.0   6458.0   6476.3 6493.4
Spanish Navy   8463.2 12930.7 13057.6
Sweden Military   4032.8 4565.0
Turkish Militaru   5333.8 5690.0
Unknown Military   4230.0   4255.0   4290.4   4296.0   4812.0   4931.8   4967.0   5106.8   6277.2   6382.2   6425.0   6507.0   6807.0   6833.3   7593.0   8573.6 12672.0 18536.0 22513.2

Algerian Military (ALE/USB)
   3035.0   3167.0   3300.0   3331.0   3390.0   4536.0   5094.0   5115.0   5120.0   5240.0   5266.0   5333.0   5374.5   5410.0   5443.0   5450.0 6838.0 11218.4 15568.0

Algerian National Guard (ALE/USB)
   4035.0   5075.0   5236.0   5555.0   7705.0   7785.0

China Military
2400 baud proprietary serial tones
   10415.0
4+4 8 tone QPSK   10466.0
ALE/USB 7978.0 9072.0
CW 5051.3 5416.5 6840.0 7059.0 7601.4
LSB/QPSK 5405.0

China Navy
CW M89 5727.0 8438.3
DTM-ARQ mode ALE/LSB   16716.0

Georgia Military (ALE/USB)
   3200.0   3400.0   3450.0   3880.0   4100.0   4350.0   4850.0   4851.7   4900.0   5280.0   5350.0 5595.0
   5650.0   6050.0   6250.0   6500.0   6750.0   7650.0   7850.0   8450.0   8650.0   9303.0

German Army   6830.0 (FEC-A)
German Navy   3116.0 (USB) 6730.0 (USB/RTTY) 6777.0 (USB) 10206.0 (USB)
German Air Force
EADS-MAHRS/USB 5065.0   5104.5   5267.5   5270.0 5355.5 5416.5 7851.0
USB 3143.0 5687.0

Israel Air Force (ALE/USB)
   3823.0   3865.0   4507.0   4681.0   4700.0   4795.0   4952.0   5123.0   5129.0   5209.0   5269.0   5395.0   5400.0   5418.0   5465.0   5470.0   5478.0   5480.0   5500.0   5581.0   5762.0   5813.0   5930.0   6224.0   6265.0   6288.0   6631.0   6731.0   6736.0   6742.0

   6748.0   6840.0   6864.0   6878.0   6925.0   6992.0   7370.0   7460.0   7630.0   7734.0   7778.0   7780.0   7848.0   7957.0   8100.0   8125.0   8135.0   8162.0   8234.0   8262.0   8300.0   8323.0   8365.0   8622.0   8858.0   9135.0   9227.0 10139.0 10614.0 10642.0 10900.0 11246.0 11349.0 11491.0 12143.0 12251.0 13072.0 14453.0 19326.0 19602.0

Israeli Defense Forces Radio Galei Tzahal (AM) 6973.0

Israel Navy 4XZ-Haifa
CW 4331.0 6379.0
ISR-Hybrid modem 4241.0   4495.0   4520.0   6618.0 8780.0 12160.0 13966.0

Italian Air Force (ALE/USB)
   4716.0 4721.0 (RTTY) 6748.0

Italian Navy
   4031.0 (USB)   4214.0 (RTTY)   5785.0 (USB)   6205.6 (USB)   6262.5 (USB)   6733.0 (RTTY)   8190.0 (ALE/USB) 12431.0 (ALE/USB)

NATO/DoD Link 11 data transmissions
4469.0 4620.0 4769.0 4772.0 5071.0 5099.0   5335.0   5417.5   5433.0   5471.5   5726.0   5895.0   6208.0   6659.0   6763.0   7459.5   7653.0   8047.0   8998.0   9007.0   9020.0   9122.5 11004.0 13206.0

United Kingdom Combined Cadet Force/Army Cadet Force (USB)
   2273.0   2413.0   2768.0   3848.0   4363.0   4443.0   4918.0   4920.5   4953.0   5328.0   6913.0 7708.0

United Kingdom TASCOMM ALE Network (ALE/USB)
   2784.0   2794.0   3236.5   3260.0   8192.0   8532.5 8980.0 10350.0 10360.0 11217.0 11292.0 14855.0

US Air Force MARS (MFSK16)   4518.0   4872.0   7680.0

US Army
Aviation Net (ALE/USB)   5666.0   6751.0   8000.0 8003.0 8056.0
Boznia and Herzegovina (ALE/USB)   9013.3
Command Emergency Operations Net (ALE/USB)   6805.0
Corps of Engineers ALE/USB 13925.5
MARS Net (Olivia) 4026.0 4028.5
National Guard ALE/USB   2540.0   2816.0   4000.0   4536.0   4775.5   4780.0   5091.5   5351.5   8047.0   8171.5   9100.0 10816.5 16338.5
Task Force Talon Afghanistan HF ALE Net (ALE/USB)   5500.0 6560.0 9190.0

US Coast Guard
SITOR-B   518.0 (NAVTEX) 8416.5
Air-to-Ground (USB) 2261.0 11202.0 15088.0
Miscellaneous (SUB) 4316.0 4426.0

US DoD Tri Service MARS HF ALE Network (ALE/USB)
   3349.0 4481.0 4765.0 7642.0 11098.5

US Navy/Marine Corps MARS (USB)
   3320.5

Well, that will do it for this month. Remember, late breaking news and additional content that I do not have room for in this column is regularly posted to my blog – the *Milcom Monitoring Post* (**http://mt-milcom.blogspot.com/**). Until next time, 73 and good hunting.

Doug Smith, W9WI
dougsmith@monitoringtimes.com
http://americanbandscan.blogspot.com

Minimalist DXing

I suppose every DXer has a dream receiver. Maybe the Ten-Tec RX-340, or the Icom IC-R9500 on the back cover of my April *MT*. I can just imagine the trans-Atlantic signals pouring in, the interference sliced away, noise vanishing as I tweak the DSP controls. I can dream of automatic DXing – of using the computer interface port to take a 10-second sample of each AM frequency across the top of the hour and record all of those station ID announcements.

There is another side to this dream. Some of us enjoy getting around on a bicycle, despite owning a perfectly good car. And a dedicated group of DXers has taken up the pursuit of DX with smaller radios. "Ultralight radio" is what they call it.

What is an ultralight radio? The document on **www.dxer.ca** sets four criteria. First, the radio must be no larger than 20 cubic inches – the size that will comfortably fit in a shirt pocket. Next, radios that include SSB, synchronous detection, selectable IF filters, or coverage of shortwave or non-broadcast frequencies aren't ultralight. Ultralight radios are those used by non-DXers. Novelty radios and those which include additional functions (like MP3 players) are too "heavy" to be considered ultralight. While DXing with historic equipment may be interesting, only radios that are still available for purchase are used for ultralight DXing. Finally, a price ceiling of $100 has been set.

The same committee that defined ultralight radio also defined two categories. A "barefoot class radio" is one used exactly as provided by the manufacturer, without any external devices used to enhance reception. An "unlimited class radio" is one that has been internally modified (for example, with narrower IF filters) and/or which has had an external antenna, filter, phaser, or similar device attached at the front end; or external audio filtering added at the output.

Sounds difficult, doesn't it. One might think DX results with a minimalist shirt-pocket radio would be, uh, minimal. However, some of these little radios are really pretty "hot." In the few months of the ultralight DX craze, both oceans have been crossed with reception of Japan in Washington State and of Saudi Arabia in Newfoundland. (Admittedly the Saudi station runs 2 million watts!) The greatest distance reported with an unmodified ultralight radio is nearly 10,000 kilometers. DX of over 1,400km has been reported on the ultra-crowded "graveyard" channels.

❖ Powerful graveyarders

DXing with a small, inexpensive receiver is one way of adding a bit more challenge to your hobby. Another way is to chase smaller sta-tions on more crowded frequencies. I've written several times about the "graveyard" frequencies, 1230/1240/1340/1400/1450/1490 kHz. These frequencies house dozens of low-powered stations, limited in the U.S. to 1,000 watts of power.

Sometimes, the rules are different in Alaska and Hawaii: In February, the FCC authorized a 10,000 watt station on one of these channels. The station will be on 1340 kHz at Honaunau, Hawaii. Honaunau is on the west coast of the Big Island. One might expect this station to be an easy target on the Pacific Coast. But there's no such thing as an "easy target" on a graveyard frequency.

The rules are also different in Canada. There has been a 10,000-watt station on 1490 in the past. (CHYM Kitchener, Ontario, which has since moved to either 570 or 1090, I forget which!) Two more-powerful graveyard stations still exist north of the border: CFYK Yellowknife (2,500 watts) and CBG Gander (4,000 watts). Canada is considering establishing a third "superpower graveyarder." CHOU-1450, a new ethnic station in Montreal, has applied to increase power to 2,000 watts.

The difference between 1,000 watts and 2,000 is minimal, as far as DXers are concerned. CHOU will remain a tough catch for anyone more than 100 miles or so from Montreal.

❖ Missouri-to-Ohio move is off

Last year I reported that the FCC had approved KELE-1360's request to move from Missouri to Ohio and change frequency to 1180. The move is off. The station has asked the FCC to cancel the permit: KELE will remain on 1360 in Mountain Grove, Missouri.

❖ CBA-1070 move complete

Last time, I reported another big CBC AM signal going off the air. CBA, the powerful New Brunswick station, finally moved to FM on April 7th. Saul Chernos managed to arrange a last-minute test broadcast in the hours leading up to the final silencing of the AM signal. Here's hoping many of you caught CBA on its last night.

❖ Another type of mystery signal

A Nashville-area listener on **radio-info.com** reported hearing a signal on 830 kHz in February. At the time, no permit existed for a station on that frequency – but "dead air" is not particularly common programming for a pirate station.

Further investigation turned up Special Temporary Authority ("STA") from the FCC for test broadcasts on this frequency. WQZQ-1550 Clarks-ville, Tenn. has applied to move to the Nashville suburb of Goodlettsville and change frequency to 830. Proper preparation of the application requires showing the actual efficiency of the proposed antenna site. Special authority was obtained to operate at a power not to exceed 250 watts, using one of the towers of WPLN-1430 near Madison, Tenn.. The STA was to be valid until June 10th, but it's my understanding that the measurements were completed long before that date.

I suppose the moral of this story is, if a station in your area is requesting a move to a new frequency, you should keep an eye on that frequency. It might be activated even if the application has not yet been approved. (If it never does get approved, then you have a DX catch nobody else will ever be able to match!) The other moral is... that weird things happen in the AM broadcast band!

❖ Pioneer AM towers to be demolished

DXer Mike Fitzpatrick reports plans for redevelopment of the land used by an abandoned Westinghouse factory in East Springfield, Massachusetts. This plant was the original site of WBZ. Arguably the third broadcast station authorized (after KDKA and WHA), WBZ broadcast from a wire strung between two towers on the factory roof – towers that are still there. In 1924, a relay station, WBZA, was built in Boston. In 1931 the Boston and East Springfield transmitters swapped functions, with Boston becoming the main station and East Springfield the relay operation; call letters were also swapped. WBZA continued to operate from the plant until 1962.

❖ FM HD power increase?

A proposal before the FCC would allow a tenfold increase in the digital power for FM IBOC stations. (Let me empahsize, the power increase proposal applies only to FM.)

As I'm sure most DXers know, IBOC/HD Radio suffers from serious coverage problems. At my location 30 miles outside Nashville, my HD Radio can receive 46 stations. Only five deliver a digital signal. Obviously, increasing power would help. It remains to be seen whether a 1000% increase in power can be accomplished without interfering with other stations – or the HD station's own analog signal.

Even without interference concerns, many HD FM stations may find it impossible to increase digital power. The combiners used to transmit analog and digital signals from the same antenna are surprisingly inefficient. Typically, 90% of the digital power is wasted as heat.

Under the original rules, digital power is usually 1% of analog. A 100,000-watt (analog) station may use a 20,000-watt transmitter, driving an antenna with a gain factor of five. If this station goes HD, the analog transmitter may need to be increased to 22,000 watts to overcome losses. And if a 2,000-watt digital transmitter is installed, 90% of this 2,000 watts is lost. The remaining 200 watts of digital power is passed to the antenna. After factoring in antenna gain, the effective digital radiated power is 1,000 watts – 1% of the 100,000-watt analog factor.

Increasing digital power to 10% – 10,000 watts in this case – requires replacing the 2,000-watt digital transmitter with a 20,000-watt unit. The amount of power lost as heat increases from 1,800 watts to 18,000 watts. 18,000 watts is a lot of heat! Chances are the combiner and "dummy load" will have to be replaced to handle the higher power. In the winter, the heat itself might be useful for keeping the building warm. In July in Arizona or Georgia, 18,000 watts of heat is hardly "useful"!

❖ DTV converter boxes

Last time I wrote that I expected DTV "converter boxes" to become widely available in April. In fact, I was being a bit pessimistic; boxes reached the shelves in March. I bought an Insignia converter for $65 after taxes. (Tennessee sales tax is nearly 10%; it's probably considerably cheaper in your state!) The $40 government coupon brought my out-of-pocket expense down to $25.

DXers are giving the best reviews to the Insignia and Zenith converters. The boxes are reportedly identical except for the logo. These boxes offer some DX-friendly features, like a signal-quality display and the ability to directly enter a RF channel number without having to rescan all the channels.
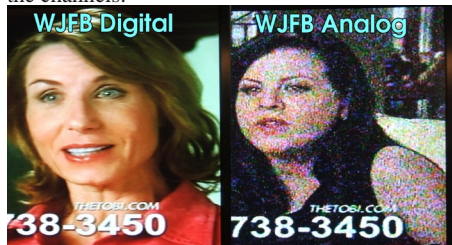
The right side of the photo is WJFB-TV as received on a regular analog TV. The left side is WJFB as received on one of the new digital TV converter boxes.

❖ Till next month

Have you heard anything interesting on a pocket radio? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to *doug-smith@monitoringtimes.com*. Good DX!

AMERICAN BANDSCAN STATION REPORT

NEW

New station permits granted

Delta Junction, Alaska	1510	1,000/1,000 ND
Many Farms, Ariz.	1260	1,000/250 DA-N (station is on the Navajo Nation)
Crescent City, Calif.	1420	1,000/250 DA-N
Honaunau, Hawaii	1340	10,000/10,000 ND
Wilton, Minn.	820	15,000/750 DA-2
Billings, Mont.	1530	50,000/750 DA-N
Silver City, N.M.	1340	1,000/850 ND
Marathon, Tex.	1470	10,000/250 DA-N
Waterville, Wash.	1450	1,000/500 ND
Mills, Wyo.	1560	10,000/500 DA-N

New station applications reinstated

Santa Fe, N.M.	1580	250/250 ND
Alpine, Tex.	1490	1,000/1,000 ND
Fritch, Tex.	1570	12,000/750 DA-2
Panhandle, Tex.	1580	1,000/500 DA-N

CHANGES

Changes denied

Bandera, Tex.	1250	KZDC	from San Antonio; increase daytime power to 35,000 watts. Application dismissed at request of station.

Changes cancelled

Albuquerque, N. M.	770	KKOB	The rumor this station would be required to reduce power to 1,000 watts was an April Fool's joke!
Ripley, Ohio	1180	KELE	from 1360 in Mountain Grove, Missouri; permit cancelled at request of station.

Stations requesting moves to new frequencies

Pukatawagan, Man.	690	CBDS	to 102.5 FM
Alma, Que.	1270	CFGT	to 97.7 FM

Stations granted moves to new frequencies

Lawrenceville, Ga.	990	WISK	from 1390 in Americus; 950/25 ND.
Chalmette, La.	1100	WOMN	from 1110 in Franklinton. Increases power to 50,000 watts daytime, 250 watts nighttime, 20,000 watts critical hours with three different patterns (DA-3).

Stations moved to new cities

Catoosa, Okla.	1570	KZLI	from Pryor

Stations deleted

Ocala, Fla.	1290	WCFI	
Monroe, La.	1440	KMLB	(the KMLB call letters were transferred to the former KNOE-540 shortly after the 1440 kHz station was deleted)
Brewer, Me.	1200	WNSW	

Callsign changes

Jasper, Ala.	1240	WJLX	from WZTQ
Eureka, Calif.	1400	KIHH	(new station)
Fresno, Calif.	1680	KGED	from KAVT
Lancaster, Calif.	1380	KOSS	from KWJL
Del Norte, Colo.	1490	KHRJ	(new station)
Eads, Colo.	1450	KEHT	(new station)
Cross City, Fla.	1240	WMJQ	from WYNY
Liberal, Kans.	1470	KSMM	from KYUU
Monroe, La.	540	KMLB	from KNOE
Brunswick, Me.	900	WWBK	from WJJB
Brooklyn Park, Minn.	1470	KMNQ	from KRJJ
St. Louis, Mo.	1430	KZQZ	from WIL
Flemington, N.J.	1040	WNJE	from WCHR
Trenton, N.J.	920	WCHR	from WNJE
Ontario, N.Y.	1330	WQCD	from WMJQ (was briefly WYNY)
Rensselaer, N.Y.	1300	WGDJ	from WTMM
Ashland, Ore.	580	KGAY	from KTMT
Eugene, Ore.	1600	KOPB	from KOPT
Milwaukie, Ore.	1010	KOOR	from KMUZ
Providence, R.I.	790	WPRV	from WSKO
Belton, S.C.	1390	WROP	from WLUA
Florence, S.C.	1230	WOLH	from WOLS
Greenville, S.C.	1260	WPJF	from WMUU
Nashville, Tenn.	880	WMDB	from WNSG
Big Spring, Tex.	730	KBQX	(new station)
Comstock, Tex.	1450	KOAH	(new station)
Langtry, Tex.	1400	KHTW	(new station)
Marathon, Tex.	1470	KHRX	(new station)
Midland, Tex.	1150	KLPF	from KVDG
Presidio, Tex.	1230	KHUA	(new station)
Richfield, Utah	1490	KYHR	(new station)
Moneta, Va.	880	WSLK	from WCQV
Jackson, Wis.	540	WAUK	from WRRD
Waukesha, Wis.	1510	WRRD	from WAUK

ND: non-directional
DA-N: directional at night only
DA-D: directional during daytime only
DA-2: directional all hours, two different patterns
DA-3: directional day, night and critical hours, three different patterns

Joining Up with Operation Lifesaver

"I think we hit something."

It wasn't so much the words, but the tone of the voice that still makes this one of the most chilling messages I've ever heard on the scanner – even though it's now been quite a few years.

I had been out in my car, running errands, with the scanner sampling the area railroad channels. Then, a train toned the dispatcher, stating that it was stopped in emergency, and then the quavering voice made that report.

An Amtrak train had struck a minivan that had driven into its path. Yes, there were fatalities. I found out about those on the local news that evening. But, I knew from the initial reports that the situation was bad.

Though the incident was only a few miles away, I didn't drive to the location. I had gotten out of daily news coverage several years before that, in part because I found myself spending too much time reporting on (and witnessing) bad things that happened to people.

The road crossing at that particular railroad location (to a railroad, a level crossing between a road and its tracks is a road crossing) was closed within the next year. Traffic to and from businesses in that area was diverted to a larger crossing nearby, equipped with warning lights and gates.

I always credit two factors with my now long-time involvement in Operation Lifesaver, Inc., the grade crossing and trespassing safety program for railroads. One was being an "ear-witness" to the above incident. The other came from a long-running e-mail exchange with a firefighter/paramedic supervisor in Colorado who also had a strong interest in railroad safety issues.

Norfolk Southern engine 4640, a GP59, is one of several such units that the railroad has decorated with special Operation Lifesaver graphics. Though they are used in normal service, they also sometimes pull special safety promotional trains. Less than an hour after this photo was made at New Bern, N.C., in 2005, this locomotive was involved in a grade crossing collision with a tractor-trailer.

❖ Operation Lifesaver

What is Operation Lifesaver, Inc. (OLI)? It's a public/private partnership whose mission is to educate the public about railroad safety issues related to grade crossings and trespassing on railroad property. OLI itself has struggled with defining its mission, but recently settled on the slogan "Railroad Safety Education."

Operation Lifesaver presenters will talk to anyone who will listen about railroad safety as it relates to the general public at grade crossings or for trespassing on railroad property. Many of the presenters can speak with authority on these issues as they are engineers or conductors who have been on locomotives involved in a grade crossing or trespassing incident.

Old railroad hands tell new hires in the operating crafts that it's not a question of whether they will be involved in such an incident, but when. Some long-time railroaders have been involved in as many as a dozen such incidents, though, fortunately, not all of them result in fatalities or serious injuries.

Operation Lifesaver presenters talk about two types of laws: Those in every state that make it illegal to ignore crossing protection warnings and the laws of physics which make it impossible for trains to stop within a short distance. And, obviously, trains cannot swerve from the tracks to avoid a collision.

Though OLI has headquarters in the Washington, D.C., area, most of the organization's activities take place at the state level. And, each of those state organizations can always use more help to get the message out. (The main OLI web site, **www.oli.org**, contains contact information for state chapters, many of which have their own Web sites.)

If you are comfortable speaking in public,

Emergency responders check out the crumpled cab. The driver, who survived with serious injuries, is being tended to by paramedics at the far left of the photo.

you can train as a presenter. But, not everyone working for the safety cause has to be a presenter. You can also help set up OLI displays at state fairs or other public events, help to hand out literature, and help in dozens of other ways.

In turn, through participating in OLI, you will get insights into railroad operations and the chance to meet a variety of railroaders. As someone who listens in to railroad operations on your scanner, you probably already have a better understanding of the challenges that railroads face than most members of the public.

❖ First-hand Experience

As a journalist, I've been able to travel on both freight and passenger locomotives and have witnessed close calls at crossings. But, ironically it was aboard a special promotional Operation Lifesaver train in August of 2005, that I witnessed a grade crossing collision first-hand. I was aboard a passenger car, not on the engine at the time, but the passenger car had a live TV feed from a camera mounted on the engine.

A semi-trailer log truck – thankfully empty at the time – pulled into the path of the train at a rural grade crossing. The resulting impact destroyed the tractor-trailer and severely injured the driver. As the camera feed from the engine was also recorded on tape, there was no question as to what happed in this incident.

The locomotive sustained minor damage, but the underside of one of the passenger cars, part of the business car fleet of Norfolk Southern, was severely damaged. There were no serious injuries aboard the train – but I am sure that the locomotive crew will always live with what happened in that incident.

❖ Awareness

As someone who listens in to and watches railroad operations, you are probably better at spotting rail safety hazards than most people. So, this is a good opportunity to note that all major railroads have toll-free emergency numbers that you can call to report safety issues. You can find these numbers on the railroads' Web sites – and all public road crossings have identification plates that not only unambiguously identify the railroad location, but also provide that phone number.

My Web site has detailed recommendations as to how to best report unsafe situations

Grade crossing identification plate on a rural crossing on a Norfolk Southern branch line in North Carolina. This plate is mounted on the pole holding the grade crossing warning crossbucks. Plates may be mounted on only one side of a crossing.
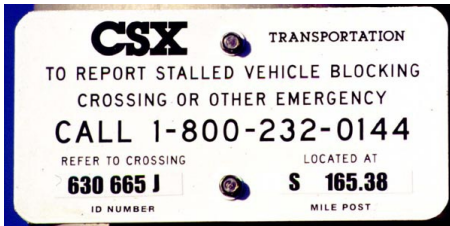
Grade crossing identification plate on urban grade crossing equipped with lights and gates. This crossing is located at milepost 165.38 on the CSX S line.

at **www.robl.w1.com/brfb/brfb-14.htm.**

This is an excerpted chapter from one of my books. The contents of the chapter are based not only on my involvement with OLI, but also discussions of safety issues with railroad officials and emergency responders.

I have called in reports to railroad safety numbers myself. And, those on the other end have invariably been businesslike and grateful for the information. In several cases I reported malfunctioning or damaged grade crossing equipment.

Depending on the railroad, emergency numbers will be answered either by someone in the railroad's dispatching center or by someone with the railroad's police force. Because the call may need to be quickly handed off to someone else, depending on the nature of the incident, it's very important to begin by just stating the basic facts: Where you are calling from and what the unsafe situation or emergency is.

Again, if you have the exact location from the grade crossing identification plate, that's very important. Even if the problem is not directly at the grade crossing itself, you can use that as a reference point, for example, reporting that there is debris on the tracks at a location half a mile [north/south/east/west] of the grade crossing [identification].

❖ Special Agents

Yes, most larger railroads – and even some smaller ones – have their own police force, with the officers being known as special agents. You may hear them calling in to a dispatcher or talking to train crews on the railroad's road channel.

Special agents are sworn police officers and have the same enforcement powers on or near the railroad property as local police officers. The special agents also act as liai-

Unfortunately, many motorists take the absence of trains at grade crossings for granted. If they haven't seen a train at the crossing the last ten times they drove over it, particularly on a rural crossing at a low-traffic line, they assume there won't be a train there this time. But sometimes they are wrong - with serious consequences. This is what Operation Lifesaver tries to educate the public about.

sons between railroad officials and local law enforcement in situations that involve crimes or accidents or which require crowd control or road traffic diversions.

These officers can cite or arrest you for trespassing on railroad property or for damaging railroad property. But, as long as you stay on public property and enter railroad property only with permission, you shouldn't have anything to worry about.

And, though I have heard of incidents involving unpleasant encounters between railfans and railroad special agents, I have to report that my encounters with special agents have been both friendly and professional. In some cases, they have even helped me with my work as a journalist.

I've gotten to know local special agents through my involvement in Operation Lifesaver – and that's also given me insights into what a tough job these agents have.

❖ Blue Flags

"Are you ready to depart [location]?" a dispatcher may ask a train.

"No," you may hear as the reply. "I'm still under a blue flag."

The blue flag is a long-time railroad safety measure, which, in these days, is most likely to consist of a thin piece of blue-painted sheet metal, rather than a real fabric flag. A blue flag may be used in connection with a device such as a derail, or may be free-standing, or in the form of a device that can be hung on the locomotive window on the engineer's side.

The blue flag has two functions: It prohibits movement; and it prevents anyone else from authorizing movement, other than the person who placed the blue flag.

While often used in major terminals or locomotive

service facilities, you may find it in use even in small passenger stations. For example, if a passenger train has a problem, it will arrange by radio to have a mechanic meet it at the next or most convenient station or siding – provided the train is still capable of moving safely.

The mechanic will arrive in a shop truck, and, most likely, the first thing he will do is hang a blue flag on the locomotive. That allows him to go between cars or even under the locomotive – with the assurance that it cannot be moved.

Even a dispatcher cannot override a blue flag.

In some cases, such as when using the portable derail depicted in my March column, the device may be equipped with a lock. Blue flag devices are normally locked with non-standard locks, or at least locks that cannot be operated by the normal switch keys issued to all railroad operating employees.

In shop areas, blue flags, such as on a permanently installed derail protecting a shop track (into a shop building), is often also equipped with a blue light to help make this indication more visible at night.

❖ Feedback

I receive occasional comments from readers, and I appreciate all of them. I certainly want to encourage more of you to let me know if the subjects I have been covering have been helpful. As I get a large volume of e-mail, please understand that I may not be able to reply to comments individually, but your comments and suggestions will all be considered.

Let me know if you have specific topics that you would like to have covered. I'll do my best to work these into future columns.

One subject that's already on the agenda is the use of radio by rail transit operations that are not normally considered part of the national railroad network, such as urban light rail systems.

A combined crew of Norfolk Southern signal maintainers and workers from a signaling contractor - working with a small truck-mounted crane - install new grade crossing protection equipment in preparation for the start of higher passenger train speeds on a line in North Carolina.

Warm Weather Tips

If you've been into longwave for any length of time, you know that summer can be a tough time for monitoring. Natural static (QRN) tends to be higher during the warmer months, often covering all but the strongest signals. This, combined with longer hours of daylight, and generally poor propagation can make LW listening a challenge. Still, this is not a time to hang up the headphones! Summer can even present some opportunities that are not available at other times of the year. This month we'll present some tips for getting the most out of your warm-weather listening.

❖ Get Started Early

The late "Longwave Wizard" Ken Cornell once told me that he didn't consider summer to be the close of the longwave DX season. He felt that there was still plenty to be heard, but that one must look for signals earlier in the day, say before 10a.m. local, before static has a chance to build up.

Ken was right. Frequently, the noise levels are quite low at these hours, and there may even be some nighttime skip in effect – especially on the higher LW frequencies. I'm reminded that one of my best Lowfer loggings was made at around 10:00a.m. local time.

❖ Try a Smaller Antenna

This may sound like odd advice for a band that most people associate with big antennas, but remember, we're talking about reception here. True, a transmitting station requires a large antenna for reasonable efficiency, but the listener can do quite well without such formalities. In fact, a typical "longwire" antenna or other large

array can actually become a "noise collector" when used on low and medium frequencies.

Quite often, the ferrite loop antenna inside most LW portables will provide quieter results. These antennas are highly directional, which can be an aid in eliminating unwanted noise. A box-frame loop is another excellent choice for receiving work. Several articles have appeared in *MT* over the years with construction details, including the September 1992 edition of *Below 500 kHz* (which has been placed on the MT Readers website). An active antenna designed specifically for LF is another low-noise option.

❖ Take a Trip

Summer is the traditional time for vacations. Why not pack up your portable receiver, a beacon directory, and your logbook for some new-to-you signals? Imagine the excitement of tuning the band with an entirely new set of signals to listen to.

The pleasant weather of summer is also ideal for tracking down local beacons. All you'll need is your portable, a local map, and a compass. By plotting two or more bearings on a map, it is possible to zero in on any local station. This time-proven technique is known as triangulation.

Another activity well suited to summer is Natural Radio. If you've never explored this aspect of longwave, why not take the plunge? You won't hear the familiar sounds of beacons down here, but you will be treated to the music of the Earth – whistlers, sferics and tweeks. If you're lucky, you might even hear the beautiful dawn chorus. A simple, yet effective natural radio receiver was described in the March and April 2006 editions of this column. Reprints are available from MT.

If your summer travels take you near the Rochester, NY area, consider visiting the Antique Wireless Association museum in Bloomfield, NY. This world-class facility has many exhibits related to longwave radio and vintage communications gear. Full information on the AWA and its museum is available online at **www.antiquewireless.org.**

❖ Magic Moments

Inevitably, summer brings with it a few power outages. You

can take advantage of these "radio quiet" events by keeping some fresh batteries on hand. With virtually all computers, TVs, fluorescent lights, motors, and other static-generating equipment shut down, the result should be static-free listening for you – at least for a little while. You might discover some signals you never knew were there. Keep your logbook handy, and happy listening.

Finally, spring and summer present great opportunities to visit local hamfests and swap meets where you might find some longwave goodies. Even if your find is a "project radio" you will have plenty of time to get it ready for the peak season coming later in the year.

As you can see, summer is not a time to hang up the headphones on the low frequencies – you just need to be a bit more creative.

❖ Mailbag

Jon Van Allen (KF7YN) wrote via e-mail while aboard the *M/V Maunawili* (radio callsign: KGEB). He was on a cross Pacific voyage out of Long Beach with stops in Honolulu and Guam enroute to Shanghai, China. After Honolulu Jon had a chance to do some LW beacon hunting with his Eton E1 (which he rates highly for LW) and an Icom R75 receiver.

Upon waking one morning at 0500 he described the situation as "beacon city"! Table 1 shows several of his catches that I was able to identify and two mystery stations. Most of these were logged in the general vicinity of Guam, which is about 13° North and 144° East. Jon used an LF Engineering Gain Probe 900 active antenna for these intercepts.

Best LW DX, and see you next month!

Beacon GE/388 kHz, Spokane, WA. Note the V-shaped antenna to the left of the building. This is for a separate 75 MHz marker beacon. (Photo courtesy of Kriss Larson)

Table 1. Beacon Loggings at Sea

Freq.	ID	Location
415	KW	Hengchun, Taiwan
413	KN	Dongshan, China
405	MD	Minami Daito, Japan
397	ON	Erabu, Japan
385	AJA	Mt. Macajna, Guam
380	LM	?? Unidentified
380	YU	Hualien, Taiwan
373	PQ	Tateyama, Japan
366	PNI	Federated States
362	CIA	Clark, Philipines
360	KC	Nagoya, Japan
344	YZ	Yaizu, Japan
338	HKG	Hong Kong, China
337	HM	Haneda, Japan
332	CRO	?? Unidentified
312	SN	Saipan, N. Mariana Is.
276	TVL	Townsville, Australia
274	DA	Hebaohu, China
272	FL	Wuji, China
257	CI	Chichijima, Japan

Pirates Week Podcast from Ragnar Radio

Ragnar Radio has been producing a weekly podcast covering activity in pirate radio. Titled, *Pirates Week with Ragnar Daneskjold,* this internet radio program has evolved into a valuable addition to the available information resources in the pirate radio hobby. Along with this column, the *Free Radio Weekly*, *Pirating with Cumbre*, and the *Free Radio Network* and *The ACE* web sites, we now have a variety of updated information resources to assist in our attempts to hear pirate radio stations.

You can check out this show at
🔊 **http://shortwavepirate.info/pw/wordpress/** on your internet radio dial. At press time for this column, the show is not yet being broadcast on any traditional or pirate radio stations.

❖ Pirate Radio Film

Richard Curtis of Tightrope Productions has announced that he began shooting in March for a feature film to be titled *The Boat that Rocked.* The subject matter is modeled on the story of **Radio Caroline,** the well known pirate radio station that got its start broadcasting rock music to the United Kingdom from an offshore ship at a time when the BBC government monopoly radio stations were not programming that format. Stars in this Universal Studios film will be Philip Seymour Hoffman, Bill Nighy, Kenneth Branagh and January Jones. Much of the film will be shot in London, UK. According to Universal Studios, the film is a comedy and not a documentary.

Meanwhile, as we see in the logs this month, Radio Caroline still exists. You can hear their streaming audio via their web site at
🔊 **www.radiocaroline.co.uk** or else their internet television channel at **www.radiocarolinetv.co.uk/**

Andy Walker of UK pirate **WNKR** provided an entertaining forum at the Winter Shortwave Listeners' Festival in Kulpsville, Pennsylvania in March. Andy's presentation was an extremely interesting documentary approach, but the new film apparently is much more loosely based on pirate radio than Andy's talk was. Andy reported at the Fest that the UK government actually licensed a historic memorial of Radio Caroline's shipboard transmissions on a one time basis, using an ID of **Offshore Radio 1584**.

❖ Barretina Web Site

Spanish Europirate Radio Barretina has posted a web site on My Space. You can hear some of their programming and view some photos of their operation on the web site such as the picture

of their antenna that we see here this month.
🔊 **http://profile.myspace.com/index.cfm?fuseaction=user.viewprofile&friendID=246089185**

❖ FCC Cancels $10,000 Fine

On February 19 the FCC cancelled a $10,000 fine from a Notice of Apparent Liability that it issued from its Tampa Office to Henry Gaye of Lake Park, FL. Larry Magne from *Passport to World Band Radio* points out that *Radio World's* coverage of this incident notes that the pirate fine was cancelled because the FCC learned that Mr. Gaye is deceased. We now know that death is one way to avoid the clutches of the FCC. We extend our sympathies to Mr. Gaye's family.

❖ BLANDX Updated

Bill Kyle, the highly paid CEO of the BLANDX corporation, announces that the 2008 issue of this hilarious parody of shortwave DX bulletins is now available. It's hard to say how Kyle finances all those trips to the Cayman Islands, since you can't beat the price of *BLANDX*. It is free on the internet at **www.blandx.com/** and you ought to take a look at it.

❖ What We Are Hearing

Monitoring Times readers heard nearly four dozen different pirate radio stations this month during a massive outburst of pirate broadcasting. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but broadcasting does increase noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Ann Hoffer Radio- She may be a relatively obscure singer elsewhere, but on the pirate bands she is a regular. (None)
Radio Azteca- Bram Stoker's DX parodies are prob-

ably the funniest pirate radio productions on the air today. (Belfast)
Captain Morgan- The captain's shows consist of rock music and Twilight Zone audio clips from "the pirate zone." (None, says to send loggings to the Free Radio Network web site)
Common Man Radio- This new one has a signature recording of a classical music piece by Aaron Copland, from which the station name is derived. (None known)
Conelrad Radio- The main theme on this one consists of air raid sirens that were associated with the old Conelrad radio system. (none)
East Coast Radio- There is speculation that this new rock music station may be associated with a production of licensed commercial station jingles that has been airing lately (*eastcoastradio@hotmail.com*)
Grasscutter Radio- Their staple format is rock music (*grasscutterradio@yahoo.com*)
Ham Radio Parody- Some pirate has been broadcasting CQ calls on the pirate bands using ham calls from actual licensed hams. This may be sly parody, but the actual hams holding the calls being used won't like it. (None)
KNBS- Yet another classic pirate station has dusted off the mothballs. Phil Muzik's voice of the California Marijuana Cooperative was entertaining years ago, and it still is. (Belfast)
Kracker Radio International- Commander Bunny's running mate programs rock music mixed with DX comedy segments (*krackerradio@pmlol.com*)
John T. Arthur- Some pirate has been relaying a clip of well known pirate DXer John T. Arthur, as he discusses the hobby of pirate Dxing. (None)
Liquid Radio- Their dance rock music format is similar to that used by **WMPR**, but this is a different station. (None)
Long Range Radio- A consensus is building that this one is associated with **Wolverine Radio.** Some shows have had IDs from both at the same time. (None)
MAC Shortwave- Paul Star is the host on this well produced replica of the old top 40 commercial radio format. Frequencies vary, with 3275, 6850, 6925 and 6950 kHz in recent use (*macshortwave@yahoo.com*)
Maple Leaf Radio- This station broadcasts oldies rock mixed with the Canadian national anthem as both an interval signal and a sign-off tune (*radio.mapleleaf@gmail.com*)
Mash Up Radio- This new one has a variable format. Rock, disco, and rap music have appeared during different broadcasts. (None announced)
Numbers Station- We have seen a sudden bout of pirates broadcasting numbers. Most appear to be parodies of numbers stations, but who knows? (None)
Radio Atlantis- This new one has been using a slogan of "The Free Voice of the Ohio Valley. (None known)
Radio Barretina- This rare pirate from Catalonia in Spain is still being heard on 6311.1 kHz both before and after 0000 UTC on some weekends with a relay of rock music programming from Radio Arboc in France. The rare transmitter site is still generating some DX excitement (*radiobarretina@hotmail.com*)
Radio Caroline- A North American pirate has been relaying a live satellite stream from this famous and historic Europirate at times. (None announced)
Radio Conelrad- This new station is dominated by their air raid siren sound effects. (None known)
Radio 6X- Their announcer Bucky has been programming oldies rock music about 20 kHz above or below 6925 kHz. (None known)

Field Day Dividends

It's June!!! It's Field Day Time!!! The smell of overcooked hot dogs and the taste of under-chilled beer!!! Time once again to take to the outer edges of our radio operating comfort zone to share in the privilege of proving that ham radio can talk to the world under any circumstances. A worthy and fun endeavor for hams old and new. It is also a time to set up shop in a way that promotes amateur radio to non-hams and maybe even encourages one or two folks to join our fraternity/sorority.

Let's dispense with the preliminaries. ARRL Field Day is always held on the fourth weekend in June, this year being June 28th & 29th. Most details related to operating can be found at the League's Web site at:

www.arrl.org/contests/announcements/fd/

If you are not currently a member of a Ham Club in your area, you might want to make use of the ARRL Club Finder Web site at:

www.arrl.org/FandES/field/club/clubsearch.phtml

With over 200 Clubs in the database, you shouldn't have too much difficulty finding a group of hams in your area planning a Field Day expedition.

If you not a big joiner, you can still locate Field Day operations near you by way of a new League Web Tool , the Field Day Station Locator:

www.arrl.org/contests/announcements/fd/locator.php

I have yet to run across a Field Day operation that didn't make Lone Wolf or Nomadic hams welcome. Heck, strangers are worth POINTS in this operating event.

In the various Field Day related columns I have written in past years, I have approached the subject of FD from just about every angle except one. That being, how any ham, with any level of skill and experience, can use Field Day to ramp up their abilities. Let's take a look at a few ways even the most casual Field Day participant might grow as a ham over this special radio weekend.

TRY A NEW RIG

Any Multi-Op Field Day station will present you with the opportunity to examine and often even operate a number of different amateur radio transceivers. Field Day setups will cover a lot of ground. You will encounter everything from the latest new DX machines straight out of the pages of any current ham magazine to classic tube rigs and home brew gear.

While Field Day is somewhat competitive, the pace is usually more relaxed than most DX contests. Since the pressure to generate QSO totals is attenuated, getting someone to give up their seat to give you a chance to sit at the controls of a rig you are curious about is usually no more complicated than asking nicely. Over the years, I have made more than a few purchase decisions based upon Field Day operating experiences.

While you might be inclined to drool over the latest gear on the Field Day site, don't let the shiny new stuff blind you to the older "work horse" rigs that often get trotted out to perform yeoman service during this weekend long activity. Many folks bring out their second or spare transceivers for Field Day. These are rigs that have seen a lot of use and you can get a sense of how they hold up over time.

When I shop for a new car, I don't look at the reviews of the new models, I look for the 50,000 mile tests to see how things hold together. The same idea can be applied to ham gear. Also, some of those second rigs may have a reasonable sales tag attached to them if you ask. It's rare in these days of eBay shopping to get to try a transceiver before you buy it. Sometimes Field Day serves up this opportunity right alongside the hot dogs and potato salad.

TRY A NEW ANTENNA

I have mentioned in this column several times that I do not use directional or rotatable antenna systems at my home station. A combination of esthetics and a thin budget keep me from tossing up anything more than simple wires to play radio. For someone like me, Field Day presents a number of neat possibilities.

Some Field Day operations put up at least a tri-bander on a short guyed tower with a rotator. Since I don't get to play with this at home, I like to wander over to that tent and spend a little time seeing how the other half lives. Also, most VHF/UHF Field Day setups will have antennas that can be pointed either manually or by motor. Again turning your best signal in the direction of the QSO points remains, for me, a novel activity.

All that said, I remain loyal to wire antennas. So I also often use Field Day to try out different wire systems. I first learned the practical advantages to the Delta Loop antenna structure during a Field Day operation. It is a design I use fairly consistently when I take my ham gear on a camping trip or vacation. I have also seen the different ways people work the problem of multi-band dipole design. There is a lot to learn from your fellow Field Day hams about stringing wire.

Field Day also allows folks to stretch the boundaries of practicality. I have been at more than one field day operation that used weather balloons to loft a quarter wave 160 meter vertical. A Field Day operation might also construct a Beverage Antenna to go along with the beverages that can be found in coolers around the campsite.

TRY A NEW MODE

If you have been reading my column for any length of time, you know I am a bit of a stick in the mud when it comes to operating practices. I like operating CW at QRP power levels, usually on 20 or 40 meters. (All right, I *have* been logged on 30 meters, but only on special occasions when I am feeling flighty and I throw caution to the wind!)

On Field Day weekend, unless my CW skills are called for to cover a station while someone goes to the outhouse, I make it a point to break from regular practice and play with other modes of operation. SSB operating opportunities are common enough at a Field Day site, so I ask someone politely to show me which end of the mic I should speak into and then off I go for a page or two of phone loggings.

But most modern Field Day sites have so much more to offer than CW and SSB. Many Field Day sites have at least one station set up for PSK31, RTTY, or other digital modes. Field Day is a great opportunity to try your hand at keyboard

based ham radio communication before you go to the expense of outfitting your personal shack.

If your CW is a bit rusty, you can head over to the CW tent and scrape off your personal patina with little fear of making a spectacle of yourself. More than a few folks only break into CW song on Field Day weekend, so you will find lots of folks on the air operating at QRS (Send Slower) speeds and asking for lots of fills and repeats. Who knows, you may get bitten by the Code Bug and I'll hear you down on the lower end of 40 some day.

TRY A NEW BAND

This is a slight variation on the above Mode theme. When I first joined the ranks of ham radio in the dark and distant past, the club I was involved with at the time had two distinct Field Day groups: the HF folks and the VHF/UHF folks. They set up essentially separate stations on the same site and really didn't seem to have a lot to do with one another. I never quite understood that. I have always had a lot of fun all over the bands.

But, if you are mainly an HF Op, maybe you might want to head for the VHF/UHF tent and give the world about 50 MHz a look-see. Likewise, if your operating practices have been limited to bands that might actually be used to roast those Field Day hot dogs, you might want to slide over to the HF tent and see what it is like to talk to another country without using a satellite to make the contact.

Speaking of satellites, Field Day stations with a good complement of VHF/UHF folks often try to grab a few contacts on satellite passes. If you have never given hamsats a try, Field Day might give you your first opportunity. The ham savvy crew members of the International Space Station have been known to be active on Field Day. You may even get a chance to talk to the ISS if you can break yourself out of your personal ham radio rut.

TRY A NEW POWER SOURCE

Field Day stations, by their very nature, are most often operated "off the grid." Generators and batteries are the order of the day. But cleaner and greener basic power sources have been finding their way into the Field Day experience. You may find Field Day operations using solar panels or even wind power to get their signals out into the ether.

Once you see how folks find ways to play ham radio without plugging their gear into a wall socket, you may want to give it a try at your home station. The basic solar power system I use in my home shack was adapted from a Field Day setup I saw some years back.

TRY A NEW RECIPE

I have been to Field Day sites with some really amazing food. I have mentioned in the past that I know of one Field Day group that enjoys the services of a gourmet chef who is also a licensed ham. (No, I will NOT tell you where this site is; you will have to follow your nose. But you won't be disappointed!) I have enjoyed working the world from a Field Day site with a burnt hot dog and a warm beer as mentioned at the start of this article. However, I can tell you it is a lot more fun to chase DX while munching on Apricot-Glazed Chicken with Peaches and Raisins and sipping a fine Chardonnay.

Okay, so between those two extremes lies the food faire that you will find at most Field Day sites.

If you let your taste buds lead the way, you will more than likely make a few new discoveries. With the exception of a few folks I know who swear they will take their chili recipes with them to ham radio heaven, most folks will be happy to share their recipes with you for use at other times and places. Don't forget to bring along the information for your own contributions to the collective table.

For the last few years *QST* Editor Steve Ford, WB8IMY has asked folks to send their best Field Day recipes in to the magazine for inclusion in a "Field Day Cookbook." The first installment of this project appeared in the June 2007 issue of *QST* and

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Radio Barretina- This pirate from Catalonia still occasionally relays the French Radio Arboc on 6311.1 kHz. This new DX target is creating some excitement.

Radio Foxtrot- This rock oldies pirate appears to be a new operation. "Dueling Banjos" is their interval signal. (None announced)

Radio Free Euphoria- Captain Ganja's primary purpose is marijuana advocacy, which he mixes with rock music and comedy. (Belfast)

Radio Jamba International- A female announcer sometimes hosts their rock music and comedy shows. They sometimes experiment with FM mode transmissions. (Belfast)

Random Radio- As implied by their station name, the format of this one changes from broadcast to broadcast. (None; asks for reports via the FRN web site)

Relaxation Radio- Thus far their programming has consisted of ancient pop music from the 1940s. (None)

Special Ed- Their format is mentally challenged remarks by the namesake of the station. He combined St. Patrick's Day and Easter references around the holidays. (None)

Sunshine Radio- Their rock music remains unusual, since this is one of the few North American pirates with a female announcer (*grasscutterradio@yahoo.com*)

Sycko Radio- Their rock music and pirate commentary are a familiar fixture on the pirate bands (*syckoradio@yahoo.com*)

Tangerine Radio- Through the magic of audio tape, Raunchy Rick's classic pirate radio comedy productions have returned to the air after a long absence. (Belfast)

The Crystal Ship- The "Voice of the Blue States Republic" with The Poet still uses variable frequencies such as 1710, 3430, 5385, and 6700 kHz for rock music and leftist political advocacy. (Belfast and uses *tcsshortwave@yahoo.com*)

Undercover Radio- Dr. Benway combines his rock music with tales about his travel adventures. (Merlin and uses *undercoverradio@gmail.com*)

Victory Radio- This new one came on to celebrate a NCAA basketball tournament win by the University of Texas. Their music was mainly by local Austin, TX groups. (None announced)

Voice of Juliet- This one joined the parade of old pirates being relayed once again. Their best joke is an ad for the Cannibal Cookbook, with a slogan of "If you can't beat 'em, eat 'em." (Merlin)

Voice of Hell- This voice of Lucifer himself has returned. They operated frequently decades ago, and now they have come back. (None current)

Voice of Oliver- Here's another new one in the unfortunate genre of various pirates attacking each other verbally over the air. (None)

Voice of Pancho Villa- Pancho's annual transmission from the Winter SWL Festival was widely heard. He found himself in rehab with Britney Spears and Charlie Loudenboomer. (Blue Ridge Summit)

WBNY- Presidential candidate Commander Bunny appeared as usual around Easter with his advocacy for the the Rodent Revolution. Recent shows have contained more clandestine station parody material than he had been previously transmitting. (Belfast and uses *rodentrevolutionhq@yahoo.com*)

WBNY (fake)- As spring arrived, we experienced an epidemic of pirate stations who pretended to be Commander Bunny from **WBNY.**

Wolverine Radio- They have been featuring a mix of rock and new age music. (None announced)

WFUQ- The suspicious call letters on this one imply an irreverent focus. But, all of our reporters who heard

it this month reported too much interference to get good copy on their show. (None known)

WNKR- Andy Walker's Western North Kent Radio has been audible lately both via North American pirate relays, and also direct from Europe. (*wnkr@rock.com*)

WSTD- Their slogan is catchy. They claim to be the pirate station that nobody wants to catch. (None)

WTCR- Twentieth Century Radio features music from the 2000s. That often is rock, but other genres from the last century are sometime represented. Look for their 20th Century Fox fanfare interval signal. (Belfast)

QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14711; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146, Stoneham, MA 02180; Casilla 159, Santiago 14, Chile; and PO Box 293, Merlin, Ontario N0P 1W0. Unfortunately, PO Box 69, Elkhorn, NE 68022 is no longer a valid address, although a few pirates announce it, and some claim to still be getting replies through it.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed Free Radio Weekly newsletter, still free to contributors via *freeradioweekly@gmail.com*. A few pirates will sometimes QSL reports left on the outstanding Free Radio Network web site, at **www.frn.net** on the internet. *The ACE,* a formerly widely read print bulletin, now has a good loggings section and a valuable archive of *Free Radio Weekly* issues on its **www.theaceonline.com/ web site.**

Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors**:** Brian Alexander, Mechanicsburg, PA; John T. Arthur, Belfast, NY; Kirk Baxter, North Canton, OH; Artie Bigley, Columbus, OH; Commander Bunny, Belfast, NY; Rich D'Angelo, Wyomissing, PA; Gerry Dexter, Lake Geneva, WI; Bill Finn, Philadelphia, PA; John Figliossi, Halfmoon, NY; Harold Frodge, Midland, MI; Captain Ganja, Blue Ridge Summit, PA; Harry Helms, Smithville, TX; Ed Insinger, Summit, NJ; Don Jensen, Kenosha, WI; Ed Kusalik, Coaldale, Alberta; Janice Laws, Montreal, Quebec; Chris Lobdell, Tewksbury, MA; Larry Magne, Penns Park, PA; Greg Majewski, Oakdale, CT; George Maroti, Mount Kisco, NY; A. J. Michaels, Blue Ridge Summit, PA; Don Moore, Davenport, IA; Curt Phillips, Raleigh, NC; John Poet, Belfast, NY; Jim Ronda, Tulsa, OK; Robert Ross, London, Ontario; Walter Salmaniw, Victoria, British Columbia; Martin Schoech, Eisenach, Germany; Lee Silvi, Mentor, OH; Arnaldo Slaen, Argentina Dale Svetanoff, Monticello, IA; Andy Walker, UK; and Joe Wood, Greenbriar, TN.

I can tell you that it was a great success amongst ham radio gastronomes. I am looking forward to this year's recipe collection.

So as you can see, Field Day has a lot to offer beyond the basic ham radio fun and fellowship that has sustained this activity over the years. So get out there and have some Field Day adventures. I'll see you on the bottom end on 40 meters – some other weekend, though. I have no idea where I'll be operating on Field Day. That's what makes it fun!

EMERGENCY ANTENNAS

Each year, on the fourth full weekend in June, the American Radio Relay League sponsors an event called "Field Day." As the ARRL website describes it, the purpose of Field Day is: "to learn to operate in abnormal situations in less than optimal conditions. A premium is placed on developing skills to meet the challenges of emergency preparedness as well as to acquaint the general public with the capabilities of Amateur Radio."

If you're not a ham, you can still get in on Field Day action by listening to operations on the air (all amateur bands, except the 60, 30, 17, and 12-meter bands). Better yet, contact the nearest ham club to get their Field-Day schedule, and visit their Field Day operations.

❖ Field Day Antennas: a.k.a. Emergency Antennas

Emergency antennas aren't just for hams; any of us might need one sometime. But don't get the idea that emergency antennas are necessarily poor-quality antennas that you throw together in a hurry. Certainly, this can be the case when the emergency is upon you, and you haven't prepared equipment for an emergency. In such circumstances, a simple wire thrown over a tree branch may actually save the day. On the other hand if, before any emergency strikes, an antenna is designed and ready, it may save that day when the simple antenna is just not enough.

❖ Planning for What Bands?

For emergency communications, frequencies are assigned and announced by the American Radio Relay League. Preparing yourself to operate on as many bands as possible enables you to be of maximum service in an emergency. Much emergency traffic is handled on the 80 and 40 meter bands; however, frequencies from MF through HF, VHF and UHF may be utilized.

Coverage around the emergency site is often via handhelds through VHF or UHF repeaters. For areas where no repeater is available, portable repeaters are sometimes brought in. The HF band is likely to be used for longer distance communications.

❖ Portability and Ease of Setting Up

Portability and ease of quickly setting up the antenna are also important factors for emergency antennas. Wire antennas are easily coiled and packed, and need only elevated tie points such as to a tree or building for installation. Whereas horizontal dipoles require two elevated tie points, inverted-Vs and slopers have the advantage of requiring only one tie point

Vertical antennas can be made in sections for easy portability. Of course, the sections must be well-connected electrically when assembled.

Perhaps the ultimate in portability and ease of use is the vehicle-mounted whip antenna installation. With such a system you are ready to operate as soon as you arrive at the emergency location.

Some amateur radio clubs outfit a dedicated emergency van with equipment capable of multi-frequency operation. These vans characteristically have several antennas, some even have collapsible, transportable towers attached.

❖ What Area Should Your Signal Cover?

Radiation patterns are of particular importance in selecting antennas. The patterns provided by beam antennas are preferred when communications are to be with stations in one particular direction (two directions for bi-directional beams) from your operating site.

For receiving, the directionality of a beam not only emphasizes receiving signals from the favored direction, but reduces received interference from other, non-favored directions. Radiation patterns are the same shape for an antenna whether it is transmitting or receiving. Thus, for transmitting, their directional patterns also reduce the likelihood of your transmissions causing interference at stations located in a non-favored direction

You may not know what area your antenna pattern needs to cover until you are at the emergency site and understand what is needed. One important factor you can adjust on the emergency site for horizontal antennas is their height. On the lower half of the HF band, horizontal antennas at low elevation (around a quarter wavelength above earth) will usually provide good local coverage with no skip zone: up to perhaps 200 miles. HF antennas with an elevation above earth of around a half wavelength are more likely to produce significant amounts of ionospheric skip, and thus support long-distance communications.

With vertical antennas, the angle of the antenna's vertical radiation helps determine the coverage. The quarter-wavelength, half-wavelength, and 5/8 wavelength – implemented as either grounded vertical or ground plane antennas – give progressively lower vertical radiation patterns, and therefore progressively better long-distance skip performance on HF. Of course verticals are known for their non-directional character on any band, and produce good local coverage. On HF their local coverage is limited to the beginning of the skip zone however.

❖ A Quick, Easy, and Effective VHF-UHF Emergency Antenna

This antenna is a vertical, half-wavelength, dipole typically designed for the VHF or UHF band. It gives good all-around (non-directional)
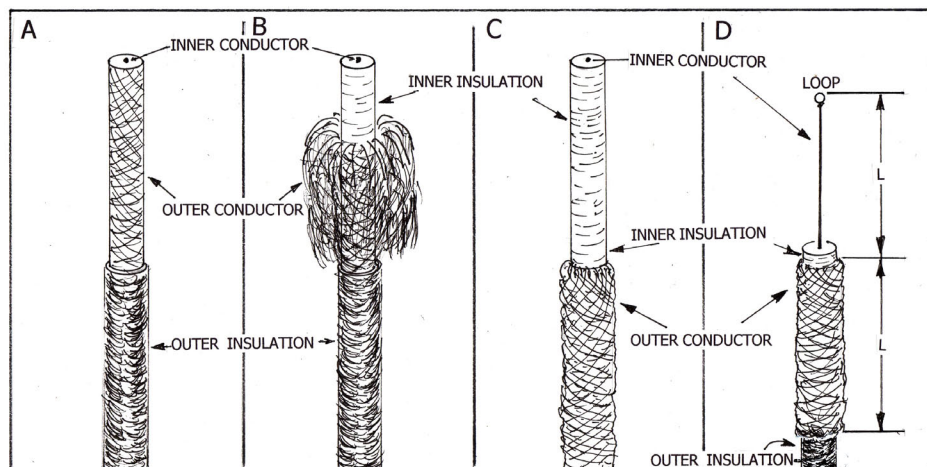
Fig. 1. COAX WITH OUTER CONDUCTOR EXPOSED (A), STARTING TO ROLL THE OUTER CONDUCTOR BACK (B), OUTER CONDUCTOR ROLLED DOWN AND IN PLACE (C), INNER INSULATION REMOVED FROM ANTENNA'S TOP ELEMENT, (D).

coverage. It's easy to pack, light weight, easily deployed, and a good performer. The antenna is actually constructed from a portion of its own transmission line. The braided shield on its coax must be the kind that can be loosened and enlarged so that the braid can be rolled back down over the outer insulation of the coax as described below. Foil-shielded coax won't work for this applicaton.

Begin with a length of 20 to 30 ft of good-quality 50 or 75-ohm coax.
Determine the length needed for the antenna's elements by the formula:
L (in ft)=234/frequency (in MHz), or
L (in m)= 71.3/frequency (in MHz).
So at 147 MHz: L = 234/147 = 1.6 ft = 19.1 in.

Remove the outer insulation from one end of the coax for a length about 2 inches longer than the length given by the formula above. This will expose the outer conductor (braid, shield) of the coax (fig. 1A).

Push the braid away from the end of the coax so that it balloons out. Then gently roll it back down over the remaining outer insulation

RADIO RIDDLES

Last Month:

I asked: "RDF antennas tend to work well with radio waves arriving as ground waves. But their use with skywaves often results in incorrect directional indications. What RDF antenna was developed to overcome this problem?"

Well, because horizontally-polarized waves quickly dissipate in the earth, any waves that travel along the surface of the ground are below it for a distance equal to the length given in the formula above (fig. 1B & 1C). Trim it if necessary.

Strip the inner insulation from the inner conductor (fig. 1D), and then make a small loop in the end of the inner conductor (fig. 1D). As you make the loop, trim it if necessary to make sure the length of the inner conductor, including the loop, is the length L given by the formula above (fig. 1D). Solder the loop where the inner conductor winds around itself.

Seal the antenna well with coax sealant where the braid enters the outer insulator. Work the sealant in well so it gets inside the braid. Some builders enclose the antenna in a plastic tube to weatherproof it.

Install a coax fitting appropriate to your transceiver at the remaining end of the coax.

For hanging the antenna, attach a strong

essentially vertically-polarized. But sky waves may have various angles of polarization. The Adcock antenna was developed to respond only to vertically-polarized waves even if, as in sky waves, waves of other polarizations are present. This avoids the errors found with loop RDF antennas which will respond to horizontally-polarized sky waves.

This Month:

What is "sky billiards?"

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX,

nylon cord (to resist wetting) through the loop. If the cord is made quite long and a weight attached to its free end, then the weight can be thrown over a tree branch or other high point to pull up the antenna. Hang it in a vertical position, and as high and in the clear as possible.

The antenna is ready to use.

Marc Ellis
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Reading the BC-221

But first, some notes from our readers!

Ed Zeranski, KG6UTS, writes that he liked the recently-concluded BC-348 series and felt it was a good introduction to saving boat anchors and other tube receivers for those who haven't done it before. Ed's comment was definitely music to my ears because that is exactly what I try to accomplish with every restoration project that I run. He also likes the idea of introducing the BC-221 and LM frequency meters. Like me, he notices that they sell for very low prices at hamfests, are fun to use and quite accurate. He uses an LM-10, an LM-21, and a BC-221-AK in conjunction with his various pieces of boat anchor equipment.

Jim Falls, KG6FWT (Eureka, CA), also enjoyed the BC-348 project. He was lucky with his own BC-348 acquisition, which came with the original dynamotor and required only minor adjustments when powered up. He also has a couple of junk BC-348s from which – bless him – he was able to supply me with a couple of control knobs to replace a pair of mine that were the right shape, but did not have proper markings.

Joe Yakoski, N3JNX, sent me a note that was very complimentary about the column, and said that he was glad it was me scratching my head about the various problems rather than him. Actually, Joe, I welcome the head-scratchers because if everything were to go smoothly, there wouldn't be much to write about! I do admit, though, that the BC-348 had more than its share.

❖ Reading the BC-221 Frequency Dials

Setting the dials to a desired frequency (or reading the dials as they are set for the measurement of an unknown frequency) first requires the use of the instrument's calibration book. And this is a good place to stress that the serial number of the calibration book *must* match the one on the instrument itself. If, at some point in the history of your BC-221, its book was switched or swapped with another one, then its readings can no longer be used.

No matter what model of BC-221 (or Navy LM, for that matter) you have, the calibration book is set up the same way. You'll find that it is divided into two sections: low (covering the 125 kHz to 2,000 kHz frequency range of the instrument) and high (covering the 2,000 kHz - 20,000 kHz range).

Take a look at the readings on the example from the calibration book (Figure 1), and you'll see that each dial setting accesses a fundamental frequency and three harmonics. The VFO (variable frequency oscillator) in the BC-221 or LM is designed to be very rich in strong harmonics. Hence the 125 to 2,000 kHz (low) range of this instrument is covered by a range of VFO fundamental frequencies of just 125 kHz to 250 kHz.

Similarly, the 2,000 kHz - 20,000 kHz (high) range of the instrument is covered by a VFO fundamental range of just 2,000 to 4,000 kHz.

Figure 2 illustrates how the reading of the desired frequency is selected, or how the measured frequency is read, on the frequency dials. Behind the vertical dial window is a calibrated drum that is geared to the main tuning dial and turns as the latter is rotated. The complete reading is a combination of the readings on the dial and the drum. The position of the drum indicates the hundreds part of the reading and the position of the main tuning dial represents the units.
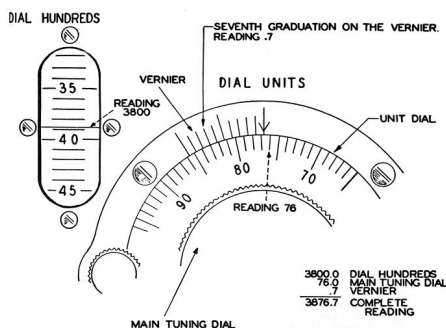
DIAL			FREQUENCY			
1	8	4.5	125.0	250.0	500.0	1000.0
1	8	8.6	125.1	250.2	500.4	1000.8
1	9	2.7	125.2	250.4	500.8	1001.6
1	9	6.9	125.3	250.6	501.2	1002.4
2	0	1.0	125.4	250.8	501.6	1003.2
2	0	5.1	125.5	251.0	502.0	1004.0
2	0	9.2	125.6	251.2	502.4	1004.8
2	1	3.3	125.7	251.4	502.8	1005.6
2	1	7.5	125.8	251.6	503.2	1006.4
2	2	1.6	125.9	251.8	503.6	1007.2
2	2	5.7	126.0	252.0	504.0	1008.0
2	2	9.7	126.1	252.2	504.4	1008.8
2	3	3.8	126.2	252.4	504.8	1009.6
2	3	7.8	126.3	252.6	505.2	1010.4
2	4	1.8	126.4	252.8	505.6	1011.2
2	4	5.9	126.5	253.0	506.0	1012.0
2	4	9.9	126.6	253.2	506.4	1012.8
2	5	3.9	126.7	253.4	506.8	1013.6
2	5	7.9	126.8	253.6	507.2	1014.4
2	6	2.0	126.9	253.8	507.6	1015.2
2	6	6.0	127.0	254.0	508.0	1016.0
2	6	9.9	127.1	254.2	508.4	1016.8
2	7	3.8	127.2	254.4	508.8	1017.6
2	7	7.7	127.3	254.6	509.2	1018.4
2	8	1.6	127.4	254.8	509.6	1019.2

CRYSTAL CHECK POINT

1	8	4.5	125.0	250.0	500.0	1000.0

Fig. 1. Each page of the calibration book has two columns of readings. This is the left-hand column of the first page of the low-frequency section. Crystal check point at bottom applies to all readings on the page.

Fig. 2. An example of how to read the BC-221's frequency dials. See text for discussion.

For instance, the dials in Figure 2 are set at a reading of 3876.7. The drum is between 38 and 39, and so represents 38 hundreds. The main tuning dial is between 76 and 77 under the index arrow, and so represents 76 units. The final step is to read the 10ths place, which is the exact distance between 76 and 77 indicated by the arrow.

How this is done might not be intuitive to those who have never read a micrometer dial. But study the drawing and you'll see that the line in the vernier area that is the closest to a line on the main tuning dial is seventh from the index arrow, counting the latter as zero. So the "tenths" figure is .7 and the complete reading is 3800 plus 76 plus .7, or 3876.7.

Keep in mind that this number does not directly represent a frequency, but rather represents the frequency (or harmonic) associated with it on the frequency table.

❖ Interpolation

But, let's say you are measuring a frequency and come up with a dial reading that is not on the calibration charts. Let's say it's 2754.2. And let's say that the nearest readings found on the chart below and above the unknown reading are 2752.7 (representing 194.9 kHz) and 2756.3 (representing 195.0 kHz. By the way, it is unlikely that you will find these exact dial readings in your book because, as mentioned, all calibration books are different.

The difference between the two readings bracketing the unknown reading is 2756.3 - 2752.7 = 3.6. This represents a difference of 195.0 - 194.9 = 0.1 kHz. Dividing 0.1 by 3.6, we come up with a figure of 0.0278 kHz per dial division. Now the difference between our "unknown" reading and our lower "known" reading is 2754.2 - 2752.7 = 1.5 dial divisions. Multiplying 1.5 X 0.0278 = 0.0417 gives the number of kHz to be added to the lower figure of 194.9 kHz to give the "unknown" frequency (194.9417 kHz), which we might round off to 194.95.

We can use the same method for setting the dials to a frequency not listed in the calibration tables, for example, 3750.5 kHz. The higher and lower "known" frequencies are 3751 kHz (dial reading 4149.0) and 3750 kHz (dial reading 4146.7). The difference in dial readings is 4149.0 - 4146.7 = 2.3 divisions. This represents a frequency difference

of 3751 - 3750 = 1 kHz. Since there are 2.3 dial divisions per kHz and we would like to raise the frequency 0.5 kHz over our lower "known" frequency of 3750 kHz, the dial reading for 3750.5 will be 4146.7 + (2.3)(.5) = 4146.7 + 1.15 = 4147.85, which we would round off to 4147.9 because that is the closest we can set the dial.

❖ Calibration

Before leaving the discussion of how to use the dial readings, we need to discuss the all-important subject of calibration. Built into the BC-221 is a 1 kHz crystal oscillator whose known harmonics – at various points in the VFO's operating range – combine with harmonics of the VFO to produce audible *heterodyne*, or *beat* notes.

When the frequency of the VFO is adjusted up or down to approach the frequency of the crystal oscillator, the frequency of the beat note goes down. It is eventually reduced to a series of rapid clicks and, finally, to complete silence. At this point, the frequency of the VFO is identical to that of the crystal oscillator.

The crystal check point for any frequency on a given page of the calibration book is printed in red at the bottom of the page. Both the VFO dial setting and, as a matter of interest, the frequencies corresponding to that setting, are given. Before using the frequency tables on any page, one must first calibrate the VFO to the check point for that page. This is done by setting the dial to the reading given for the check point, setting the operating switch so that both VFO and crystal oscillator are turned on, and listening for the beat note in the headphones.

If there is no beat note, either the BC-221 isn't working properly or the calibration at that point is perfect. But most probably, you will hear a note. Then the "corrector" knob – which tweaks the frequency of the VFO – is slowly moved one way or the other to lower the frequency of the beat note until the note is silenced. Then the crystal oscillator is shut off and the VFO settings for any frequency on the page will be accurate. Should there be more than one beat point within the range of the corrector, the loudest one is invariably correct.

❖ Operating Switch Positions

The positions of what I call the "operating switch" for the BC-221-AL (also applies to the -AJ model) were discussed last month. Now let's take a quick look at the operating switch positions for the other models.

In the case of models -A, -C, -D, -F, -J, -K and -L, it's just a two position switch selecting "Crystal Off" (only VFO is energized, for frequency generation or measurement) or "Crystal On" (both VFO and crystal oscillators energized for calibrating at checkpoints). In the case of models -B, -E, -N, -Q, -AA, -AE, and -AG, there is no separate power switch and an "Off" position is included on the operating switch. The other positions are "Crystal" (crystal oscillator only), "Operate" (VFO only), and "Check" (crystal oscillator and VFO).

Models -M, -O, -P, -R, -T, -AC, -AF and -AH have a three-position operating switch marked "Het Osc" (VFO only), "Xtal Check (crystal oscillator and VFO) and "Xtal Only." The model -AK is another with a combined power and operating switch. It has an "Off" and a "Warm-Up" (VFO tube filament only energized – see discussion of BC-221-AL in last month's column) position . The "Crystal" position energizes the crystal only; the "Operate" position energizes the VFO (unmodulated) only; the "Modulate" position energizes the VFO with modulation; and "Check" energizes both the VFO (unmodulated) and crystal oscillators.

An interesting chart in the Technical Manual for the BC-221, estimates the accuracy of the BC-221 series of instruments under what are considered worst case conditions (4,000 kHz and its harmonics at a temperature of -30 degrees Centigrade). I'm reproducing the chart here as Figure 3. It's instructive to look at all the factors that can go into estimating possible error. Although all of them have been added to give a maximum total of 1,355 Hz at 4,000 kHz (0.034%), in real life some of the factors might lower the indicated reading while others might raise it – thus canceling out some of the error.

❖ Next Month

Next month, I hope to be able to power up and try out the BC-221-AL. Power requirements given in the technical manual are: 6 V at 0.91 A for the tube heaters and 136 V at 0.018 A for the plates (with all circuits energized). The traditional method to apply a.c. power to these sets is to find a power transformer providing the 6 volts as well as maybe 200 volts each side of a center tap for full-wave rectification via a vacuum tube or diode. The rectified 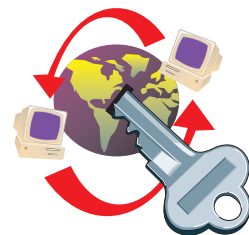output is then filtered and stabilized at 150 volts by a gaseous voltage regulator tube like the 0D3 or the miniature 0A2. Those of us who have pretty well stocked junkboxes can usually turn up some transformer that can be adapted. In fact, the previous owner of my BC-221 had installed an a.c. supply (which I removed without testing) that utilized a small transformer with many taps in the primary and secondary connected in such as way as to yield 175 volts from a 115-volt input.

However, if you've ever checked the selection and prices of even surplus transformers, you've been struck by the limitations of the former and the size of the latter. I'm working on a scheme using a couple of easily-obtained and reasonably priced Radio Shack low-voltage transformers–but more on that next time!

	Cause		*Error*
(1)	Small shocks (caused by handling, and the thrust on the dial and pressure on the panel when using the equipment)		100 cycles maximum
(2)	The action of locking the dial		30 cycles maximum
(3)	Warming up		100 cycles maximum
(4)	Changing of load on the antenna post		50 cycles maximum
(5)	A drop of 10 percent in battery voltage or a change of 5° centigrade, in the surrounding temperature		325 cycles maximum
(6)	Error in calibration		500 cycles maximum
(7)	Error in crystal frequency		250 cycles maximum
	Total		1,355 cycles maximum or 0.034% at 4,000 kc.

Fig. 3. From the Technical Manual: an estimate of BC-221 error under worst-case conditions. See text.

FIRST LOOK

Larry Van Horn

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GRE PSR-600 – A Lot of Scanner for the Money

When GRE first announced that they were striking out on their own and releasing a new suite of scanner models into the marketplace, there was a lot of buzz among the scanner hobby community. I was fortunate last year to test drive their first entry, the PSR-500 handheld for *MT* (November 2007, page 66). But I must admit I have always been a desktop/mobile kind of guy. I know that you can build a bit more radio into a larger case, it won't be nearly as crowded, and you get a few extras you don't get with a handheld.

So when the PSR-600 desktop/mobile, the companion model to the PSR-500, became available for testing, I eagerly looked forward to putting it through its paces and I was not disappointed. The PSR-600 is a lot of scanner for the money.

❖ PSR-600 Advanced Digital Base/Mobile

Recognizing that contemporary scanning receivers are difficult to program and use, GRE's engineers conducted extensive research to determine the functional requirements for an entirely new scanning receiver user interface. They call this new intuitive user interface the *Object Oriented User Interface* (OOUI).

It is based on the premise that, to a hobbyist, a scanner is easiest to use if all of the things that can be scanned are handled using common conventions for interaction between the user and the radio, at least to the extent that this is possible. Granted, the "things" that can be scanned may be different from one another in either subtle or major ways.

In this new user interface design, they call "things" that can be scanned, "Scannable Objects." Simply put, a Scannable Object is defined as something that can be scanned or monitored, which includes:

• Conventional, non-trunked radio channels
• Trunk talkgroups used on a trunked radio system
• Service searches to search for a specific radio service
• Search ranges with upper and lower limits
• Spectrum Sweeper setups with band segments that can be enabled or disabled by the user

One of the goals of the Object Oriented User Interface is to make the scanner as easy to use as possible. The OOUI does this by treating all Scannable Objects the same, in terms of how they are created, edited, manipulated and grouped. Once you have learned how to create and store a conventional channel, you know most of what you need to know to create a trunking talkgroup, and so on.

❖ Case, Controls and the Antenna

The PSR-600 is a descendant of the popular RS Pro-2096 scanner. But this isn't your daddy's Pro-2096, so all other comparisons would be fruitless.

The PSR-600 case is about the same size as a Pro-2096 measuring approximately 7.3 (w) x 5.3 (d) x 2.2 (h) inches, 185 (w) x 135 (d) x 55 (h) mm and weighs in at 27.7 ounces (790 grams) not including mounting hardware and antenna.

The liquid crystal display (LCD) is part of an amber backlight system and consists of four lines of 16 characters each, plus 13 display icons. The keypad is also part of this backlit system.

One of the most innovative features of this radio is its programmable, multi-colored, super bright LED with audible alarm capability. This unique alert capability allows you to set different types of visual and audio notifications for different types of objects that the user creates.

For instance, I use a steady blue LED and a certain audio cue for the local law enforcement agencies I have programmed into the scanner. I use a different audio cue and flashing blue LED for law enforcement agencies outside my immediate area. I use the same solid flashing model for other public safety agencies, e.g., red for fire, white for EMS, green for federal, etc.

The Alert LED utilizes a special tri-color Light Emitting Diode module that mixes light from red, green and blue LED elements to produce thousands of different colors. Eight pre-defined color settings are available for use in object menus.

Much like its GRE-500 cousin, there is one knob on the front of the unit that controls volume (inner knob) and analog squelch (outer ring). There is also a headset jack and a PC/IF jack for interfacing the scanner to a computer or sound card (both use third party software). On either side of the front panel you have a DIN keyslot for mounting the scanner in a vehicle using that method.

MT Rating [4-3/4 stars]

The heart of the front panel, though, are the 34 keys which control and program the scanner. The backlit keyboard consists of three soft keys (F1/F2/F3), operations keys, a numeric keypad, and a five way pushbutton pad.

The soft keys are used to activate functions shown in the LCD display which are immediately above them on the LCD display. The five way pushbutton pad keys are used for navigation while browsing objects and menus. The SEL key activates data entry fields and toggles scan list selection in object menus. FUNC SEL activates context sensitive help in menus.

The numeric keypad is used for data entry of frequencies, talkgroup IDs and alphanumeric labels.

There are 12 operation keys that control the following scanner functions:

FUNC – Activates alternate key functions.
DIM – Controls backlight brightness.
MAN – Places scanner in manual mode for monitoring single objects.
SCAN – Places scanner in scan mode for scanning enabled objects. Hitting FUNC then SCAN launches Spectrum Sweeper.
TUNE – Allows direct tuning of any valid frequency, FUNC plus TUNE loads the current or most recently scanned frequency into TUNE.
SRCH – Puts the scanner into a dedicated search mode for service and frequency searches.
ATT – Toggles attenuator on and off and FUNC plus ATT toggles a global attenuator mode.
PRI – Toggles the priority setting for the selected or active object. FUNC plus PRI toggles priority mode on or off for the scanner
FAV – Activates the favorites scan mode while

MT FIRST LOOK RATING (0-10 SCALE)

Audio Quality	8
Audio Levels	9
Backlight/Display	9
Dynamic Range	7
Ease of Use	8
Feature Set	9
Keyboard/Button/Control Layout	9
Overall Construction	9
Overall Reception	7
Owners Manual	8
Sensitivity	9
Selectivity	8
Spectrum Usability	9

PSR-600 FREQUENCY COVERAGE

Freq Range (MHz)	Default Step (kHz)	Modu-lation
25.0000 - 27.4050	10	AM
27.4100 - 29.5050	5	AM
29.5100 - 29.7000	5	FM
29.7100 - 49.8300	10	FM
49.8350 - 54.0000	5	FM
108.000 - 136.9916	8.33	AM
137.000 - 137.995	5	FM
138.000 - 143.9875	12.5	FM
144.000 - 147.9950	5	FM
148.000 - 150.7875	12.5	FM
150.800 - 150.8450	5	FM
150.8525 - 154.4975	7.5	FM
154.5150 - 154.6400	5	FM
154.6500 - 156.2550	7.5	FM
156.2750 - 157.4500	25	FM
157.4700 - 161.5725	7.5	FM
161.6000 - 161.9750	5	FM
162.0000 - 174.0000	12.5	FM
216.0025 - 224.9950	5	FM
225.0000 - 379.99375	6.25	AM
380.0000 - 419.987500	12.5	FM
420.0000 - 450.000000	5	FM
450.00625 - 469.99375	6.25	FM
470.00000 - 512.00000	12.5	FM
764.00000 - 805.996875	3.125	FM
806.00000 - 901.987500	12.5	FM
902.00000 - 928.000000	5	FM
928.00125 - 939.987500	12.5	FM
940.00000 - 1300.00000	6.25	FM

Note: The scanner's frequency coverage is not continuous and does not include the cellular telephone, FM broadcast, VHF-TV low channels, or some UHF TV channels. Excludes by US federal law cellular telephone frequencies: 824-848.9875 and 869-893.9875 MHz.

FUNC plus FAV adds the current object to the favorites scan list.

WX – Activates the weather scan and FUNC plus WX activates Skywarn mode

PGM – Places scanner in program mode for editing radio-wide options, adding new objects or editing existing objects. Hitting the FUNC plus PGM keys accesses V-Scanner mode.

The back panel of the scanner has a BNC antenna connector, external speaker jack and an external DC power jack.

❖ It's what is under the hood that counts.

Looking inside the radio we found a wonderful world of scanning capability. Here are some of the features that the PSR-600 offers.

Ungradable CPU and DSP Firmware – You can easily keep your scanner current with software enhancements as they become available with free upgrades from **www.greamerica.com**.

Menu Driven Programming with Context Sensitive Help – Each menu item provides a few lines of help text that provide assistance with programming and using the scanner.

Powerful and Flexible Scan List Functionality – Allows you to arrange, group and scan objects according to your preference, with no limit to the number or types of objects in a Scan List, and no limit to the number of Scan Lists an object can be a member of.

Flexible Free-Form Memory Organization – Memory is assigned as objects are created using a sophisticated internal file management system. You are not constrained to traditional bank/channel scanner memory layouts as you were with the older scanners. No memory is wasted as a result of bank/channel programming constraints. The scanner has sufficient main memory capacity to store over 1800 conventional channels, trunking talkgroups,

search configurations and Spectrum Sweeper objects in any combination.

GRE's Exclusive V-Scanner Technology – Allows you to save complete radio configurations within the radio for recall into main memory as needed in the field. This is similar to having a laptop computer and programming software available anytime. You can use V-Scanners to store configurations for different geographic areas or usage styles. Twenty-one V-Scanner folders are provided, each capable of storing over 1800 objects. Total memory capacity of main memory combined with V-Scanners is over 39,600 (1800+37800) objects.

Remote Control Capability – These scanners can be used with third party application software to remotely control a scanner from a personal computer. Uses GRE's 30-3290 USB cable in full duplex mode at six times the speed of previous scanner models for PC transfer and eight times the speed of previous models for radio-to-radio cloning.

You might be familiar with Uniden's Close Call – or Radio Shack's Signal Stalker – RF capture technology. GRE's equivalent in its new scanners is called Spectrum Sweep. In head-to-head testing with Close Call and Signal Stalker, we found that Signal Sweep was an improvement in the quiet RF environment we tested it in.

GRE's exclusive Automatic Adaptive Digital Tracking instantly adapts the digital decoder to the digital modulation format of the transmitted signal, then analyzes the signal over 50 times each second and adapts to any subtle changes caused by multipath or fading. No cumbersome manual adjustments are required. In my test this worked most of the time for most of the P25 systems in the area.

CTCSS and DCS subaudible squelch coding is processed by the same powerful DSP chip that is used for P25 digital decoding. It provides fast and reliable decoding of subaudible squelch signaling with squelch tail elimination.

The PSR-600 has a digital AGC that instantly compensates for low audio levels that are very common on digital systems. This makes the radio's digital communications easier to listen to in combination with the adaptive digital tracking mentioned above.

Like many of the recently released scanner models, the PSR-600 will perform a NOAA weather band search, SAME weather alert, weather priority scan, and a new SKYWARN Storm Spotter function (see below).

There are a lot of other PSR-600 features, far too many to include in this review. You can get more information on these features by going to my personal blog page at **http://monitor-post.blogspot.com/2007/08/gre-psr-500-handheld-and-psr-600.html.**

❖ Multi-System Trunk Capability

The PSR-600 is a multi-system trunking scanner. This lets the user follow unencrypted conversations on analog Motorola, Motorola mixed mode (3600 baud) systems, P25 (APCO 25 9600 baud) systems, EDACS (wide and narrow), EDACS SCAT, and LTR trunked radio systems. Trunk systems in VHF, UHF, the new 700 MHz public safety band, 800 MHz, and 900 MHz bands can be programmed. This includes trunk systems

MISCELLANEOUS SPECIFICATIONS

- Triple conversion PLL super-heterodyne scanner.
- 1st IF 380.8 MHz (The 1st LO uses high side of receive frequency range for VHF and UHF Low/T, and low side of receive frequency range for >512 MHz)
- 2nd IF 21.4 MHz (The second LO uses low side of 1st IF)
- 3rd IF 455 kHz (The 3rd LO uses the low side of the 2nd IF)
- Attenuator (20 dB).
- 55 channels per second scan speed and 90 steps per second search speed.
- User defined service and limit searches.
- Earphone jack (3.5 mm stereo).
- Internal speaker 64 mm 8 ohms, 1.8 watts audio output
- PC Interface/Clone jack (3.5mm stereo). Computer cable (GRE USB cable No. 30-3290)
- Memory Backup: No battery backup required. EEPROM used.
- Operating voltage: 12-16.4 VDC, 13.8 VDC nominal, 16 VDC maximum

Note: Features, specifications, and availability of optional accessories are all subject to change without notice by the manufacturer. Information presented above was based on the test unit provided by the manufacturer.

now being installed by the Department of Defense in the new 380-399.9 MHz LMR subband. The scanner can also scan both conventional and trunked systems at the same time. The PSR-600 will not decode M/A-COM proprietary modes such as Open Sky and ProVoice. Talkgroup call and individual call monitoring are supported.

I was especially impressed with the trunk system information presented on the display when the scanner was put into the tune mode and a control channel was being monitored. This is the best implementation of this feature I have seen thus far by any manufacturer.

❖ What's in the box?

In addition to the PSR-600 scanner, accessories in the box include a whip antenna; owner's manual; mobile mounting bracket with rubber feet, rubber washers and knurled knobs; DC cable; AC adapter; and USB PC interface cable.

❖ What Else is New?

In addition to the Object Oriented programming and the LED/Audio alert, here are three more features on the PSR-600 scanner that are new to the scanning world from GRE:

- SKYWARN Storm Spotter Function – Provides instant, one button access to frequencies used by storm spotter networks. You can monitor storm conditions as they occur, and may become aware of dangerous weather conditions before the media and emergency management officials are able to announce them to the general public.

- P25 NAC Functionality – Much like CTCSS and DCS with analog signals, a P25 Network Access Code (NAC) is used to provide selective squelch operation on conventional P25 channels. This GRE digital scanner will detect the NAC that is being used on a P25 conventional

Diamond Cut Seven
Bridging Analog Audio to the Magic of Digital

By John F. Catalano

Imagine you're trying to monitor that rare shortwave DX catch or Dxpedition station, only to have signal fading, atmospheric crashes and station interference make it impossible! It's happened to all of us. But a program called Diamond Cut Seven (DC 7) could possibly save the day by digging the station's audio out of the muck. Not a recording of it, but in real time, using the audio from your radio.

"Magic," you say? Perhaps. But as the late Arthur C. Clarke postulated in his third laws of prediction, "Any sufficiently advanced technology is indistinguishable from magic." So, let's take a glimpse behind the wizard's curtain to see and, of course, *hear* if this monitoring "magic" is real.

❖ Our World

Humans are analog creatures. A continuous range of sensory intensities stimulates our senses. For example, our tympanic membrane, the eardrum, responds to air pressure waves, which we called sound. We catalog sounds as louder or softer and higher or lower in pitch. Our sensory perceptions are all relative, based on our recent experiences. This is the essence of our analog world.

We don't see, feel, taste, or hear in discrete steps of ones and zeros. But, these are the makings of the digital world where signals are absolute and do not rely on relative levels. However, once analog signals are converted into the digital domain, they can be manipulated, enhanced and then reconstituted in ways that we analog beings can only conceive of as magic.

❖ DV Seven

DC Seven (DC 7) from Enhanced Audio (**www.Enhancedaudio.com**) bridges the gap between the two worlds, analog and digital, in the audio spectrum. It works all the magic that the digital world can muster, using powerful digital signal processing algorithms. And then DC 7 returns the data back to the analog human audio interface, which is sound.

DC 7 is not cheap at $159 (on line) and $199 on CD. But, based on its feature set, it is comparable to competitor software suites which start at $799 and go way, way up from there. So, *if* it works as advertised, DC 7's price is a steal for audiophiles, hams, radio monitors, professional audio studios, and, shall we say, government work? We may not be able to evaluate the package to the satisfaction of all these groups, but let's see what we can do with DC 7 as radio monitors with little or no professional audio processing experience.

It is said that necessity is the mother of invention. DC 7, developed over a 13-year
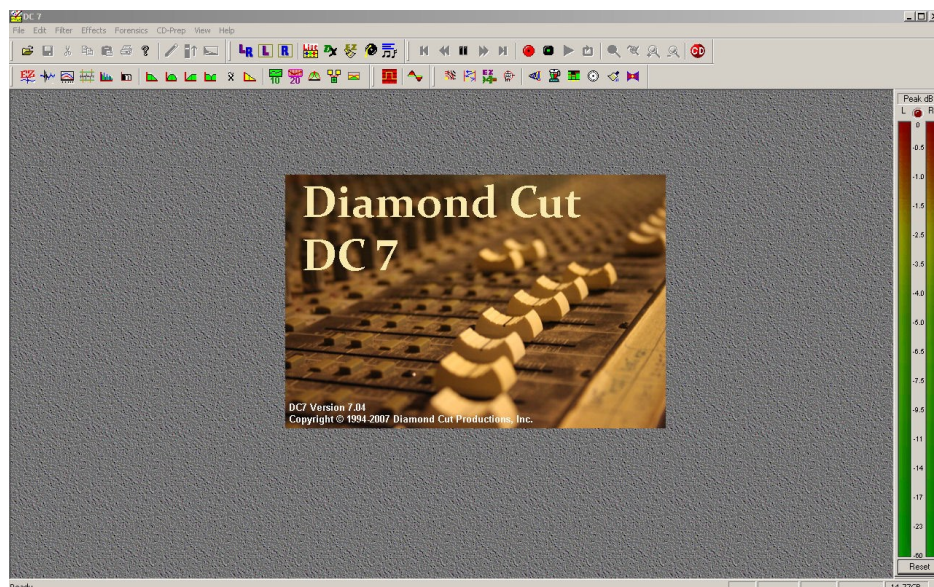
Figure 1 – DC 7 Main Screen – Gateway to audio file magic – command bar menus at top & level meters on right.

period, is the brainchild of two recording engineers. They had a goal to build an audio archive using old recordings, which in many cases were almost unintelligible. In order to restore these audio recordings, they created the first version of this program. Over the past year it has been updated, improved, and developed into its present version, DC 7.

DC 7 can optimize audio intelligibility and in many cases make it understandable. The list of applications includes audio recordings from vinyl records (anyone remember those?), magnetic tape recordings, compact disks, and computer files, such as wave files. However, its use is not limited to just pre-recorded audio. Using the "Live" feature of DC 7, audio from live sources such as telephone and (*yes*!) radio receivers/ham transceivers can be restored in near-real time.

In this two-part series we will cover the capabilities, installation and basic functions of DC 7. Once we become familiar with DC 7, we will perform detailed applications covering a number of the above uses, including, of course, live radio and ham monitoring applications.

So you can actually hear and judge for yourself the difference DC 7 makes, we will post the "before" and "after" audio files of each our endeavors on the *MT* website.

❖ A *LOT* to Cover

Keep in mind that DC 7 is a very powerful program with filter presets, multi-filter combinations, audio preamps with various built-in equalization curves, comprehensive tube amplifier simulations and much, much more.

The User's Manual for DC 7 is a whopping 450+ pages – of which 367 pages are directed to instructions and applications of the program. A 30-page section includes useful general audio information including a rich glossary of terms, and 50+ pages of the manual contain a collection of not-to-be-missed standard charts, graphs and very interesting audio information.

Clearly we can't begin to cover what DC 7 can do in detail. Instead, we'll do our best to give you a flavor of DC 7's basic operation for radio monitors and hams in this first two articles.

Okay, so let's get started down the road of audio restoration magic.

❖ What is DC 7?

The program is actually a collection of DSP (Digital Signal Processing) routines. Some simulate audio filters of various types. Others perform specialized amplification functions. Many of these have complex characteristics tailored to audio applications. High levels of audio customization for specific applications are achieved using multiple filters and function blocks. And, getting more sophisticated, these can be chained together in various sequences. (Now you can see why the manual is 357 pages.)

But how is an audiophile, radio monitor or ham to know which DSP routines to use and how to put them together? DC 7's answer is simple. You don't have to know anything about DSP routines. The creators of DC 7 have arranged the menu-driven program by

audio application using preset filters. Over 800 preset filters are included. However, for the adventuresome and experienced, DC 7 provides the user control over just about every filter parameters! This allows detailed customization to the user's exact and specific audio needs.

In most cases we'll follow the simpler preset route for this article. For example, if you have a recording made from a vinyl record, you can probably hear clicks, pops and other noise. The clicks are the result of surface scratches. The pops are the result of static discharge, not unlike atmospheric noise (QRN) heard on shortwave signals.

We'll see how, with just three mouse clicks on DC 7, we can greatly reduce or even remove these annoying noises complete. That's what I call simple!

❖ System Requirements

Clearly these powerful DSP routines require more than a 486 processor, but, surprisingly, not much more. DC 7's minimum PC processor requirement is the eight-year-old 750 MHz Pentium, not exactly state of the art. (More like state of the ark.) However, if you are going to string together multiple functional blocks or use the Live feature, a faster PC may be required.

To start, a reasonable quality 16 bit sound card with line level inputs is needed. Since we are definitely going to use the Live feature for real time radio monitoring, a full duplex sound card is required. A full duplex sound card allows playback and recording of an audio signal at the same time.

Don't forget lots of hard drive space. The program occupies about 20 MB. But you will need 2.5 GB for each full audio CD you intend to create: At a sample rate of 44.1 kHz, a stereo recording uses 10.5 MB of hard drive space per minute. And finally, since the program comes on CD, a CD ROM player is required. If you intend to register the program via the Internet, an Internet connection is needed.

DC 7 runs on Windows XP with the SP3 update and 512 Mbytes of RAM, or Windows Vista with 1024 Mbytes RAM. For XP users, DirectX 5.0 or higher is required.

We used a Toshiba A135-S2276 laptop with a 1.6 GHz Duo Core T2060 CPU, 2048Mbytes of RAM and a Vista Home Basic operating system. The Vista OS has DirectX 10 installed and our hard drive had 22 GB of free space. The laptop has an IXP SB450 High Definition Audio Controller using the Realtek High Definition Audio Suite. This sound card combo performed perfectly with DC 7.

❖ Install, Register, Configure

Installation from the CD is easy and takes about three minutes. Once the program loads, the unique serial number must be entered, along with the owner's name exactly as it was entered when the program was purchased.

Finally, we must register the program with Diamond Cut before the program will run. If you have an Internet connection, the program can do the registration automatically. Email or telephone registration is also possible.

We're almost ready to run … Next, turn off all background tasks on the PC. If you have a screen saver enabled, turn it off. These tasks may interfere with the DC 7's operation by competing with it for the processor's attention. Now we're ready to go.

❖ Running DC 7

You might think that accessing all the power, features, and functions would require tons of complex menu screens. Not so. The authors of DC 7 have done a great job creating a simple user gateway, as seen in Figure 1. The Command Icon rows can be seen at the top of Figure 1. Level meters are displayed vertically on the right side. Signal waveform display and function block applications take place in the center in the screen.

The User Manual is very well written and takes the reader from basic concepts to full applications. It is rich with audio theory and is an excellent "everything you want to know" audio filter resource. It is well worth the time to read this voluminous document. But with our limited time we are going to use an OJT, On the Job Training approach. We'll start each of our work-through examples by stating a particular audio need that requires our help. Here are the three we will cover in these two articles:

A scratched and worn vinyl record of music with clicks and pops.
Recording of audio (voice) from a receiver, at a very low level that is barely intelligible.
Live audio (voice), from a SWL or Ham receiver with signal fading, atmospheric noise QRN and signal interference QRM.

Our first project will provide a very simple learning exercise. This will be useful to learn first principles, but will also appeal to the vinyl worshipping audiophiles among us. Then we will build on our experience and advance to enhancing a recording of a signal made from a shortwave broadcast. And finally, we'll take on the task of cleaning up live audio taken right from a receiver/transceiver's speaker output, for real-time audio restoration.

As we work though each example, we'll learn the basics of capturing the audio, filter and function block choices, application of the blocks to audio, listening to the modified audio, possible re-application, and finally, saving the restored audio. Again, keep in mind that we are just touching the surface of what DC 7 can do.

❖ Starting Slow

Let's try a relatively simple task to start. How about cleaning up the music from an old Korean vinyl recording? (Okay, so it's not exactly U2. But the audio was provided by Diamond Cut and is

Figure 2 - Virtual phono pre-amp in the default preset ready to play/record vinyl LP
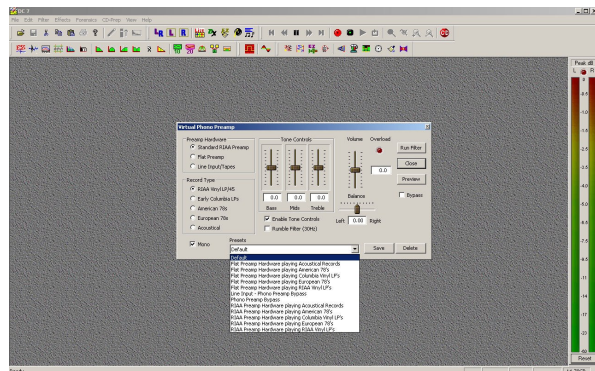
a good first example.) We start by attaching a cable from the line output of our stereo to the line-in of our PC's sound card. Alternatively, using DC 7's Virtual Preamp and adding gain, we can go right from the turntable outputs to the sound card. The Virtual Phono Pre-Amp is shown in Figure 2.

Notice the wide range of preset choices that are available, as seen in the open box at the bottom. You can choose one of these presets or set your own bass mid and high tones, along with the other preamp settings. You can then save it as a new preset if you wish.

We're going to go simple and pick the default: flat tone levels, Preamp Standard RIAA, Record Type RIAA Vinyl LP/45, Rumble Filter Off, and Volume Control set to mid range.

Next, we play our record selection and have DC 7 save it as a "Source" file in the wav format. We will limit the selection time to about 30 seconds to make it easier for you to download from the *MT* website. We have named this **Vinyl 1 Source.wav**

Now display the Source file by selecting "Open Source" under the "File" menu. Figure 3 is the resulting display, showing the audio waveform and the elapsed playtime in seconds at the bottom. Notice that our audio piece starts at approximately 3 seconds into the recording and ends at 30.6967 seconds.

Pressing the Space bar starts and stops the playback of the opened file, which can be heard on the PC speakers. A vertical line marker travels across the waveform from left to right, indicating exactly what we are hearing at any instant. In Figure 3 you can see the marker just left of the 23.4996 second timing mark.
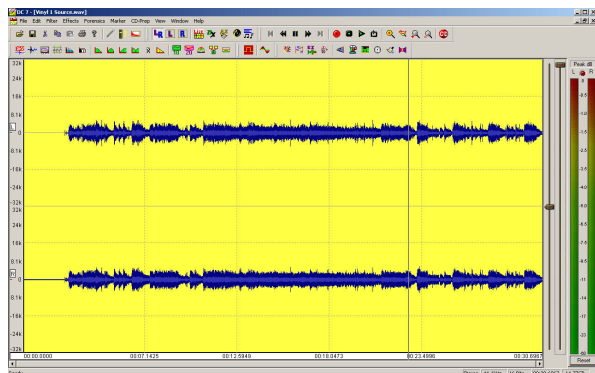
Figure 3 – Displaying & playback of our captured 30.6967 seconds of Korean music from LP. Notice the playback mark to the left of 23.4996 seconds.
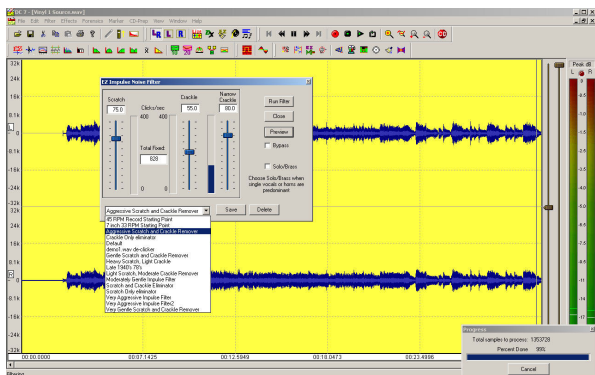
Figure 4 - EZ Impulse Filter about to clean out the crackle and pops with one click!

❖ EZ Does It

There are many, many different methods of restoring vinyl LP audio in DC 7. We are going to use the very simplest for our first project. In fact, it is called the EZ Impulse Noise Filter. Access it from the first Icon on the left of the second row of icons in Figure 3: Click on the letters EZ. We can also get to the EZ Impulse Noise Filter via the dropdown Filter menu at the top of the display.

With the Source file (**Vinyl 1 Source. wav**) displayed, click the EZ Impulse Filter icon. Now the EZ Impulse Filter Box will be displayed as shown in Figure 4. If the user hits the F1 key while a functional block box is being displayed, instructions for its use will also be displayed. This makes using the Help file a pleasure instead of a chore.

In order to really scrub the audio clean, we have selected one of the filter's sixteen presets, "Aggressive Scratch and Crackle Remover." Notice in Figure 4, the three buttons on the right side of the filter box. The Preview button allows the user to hear the results of applying the chosen filter preset or custom settings.

If it results in sound to your liking, the Run Filter button does the job and places it in a Destination file. Using the "Save Destination As" under the File menu, the filtered/restored file has been resaved as **Vinyl 1 EZ Impulse-Filter Aggressive S&P.wav**.

❖ Hear for Yourself

Go to this column's website at **www.monitoringtimes.com/html/computers-radio.**
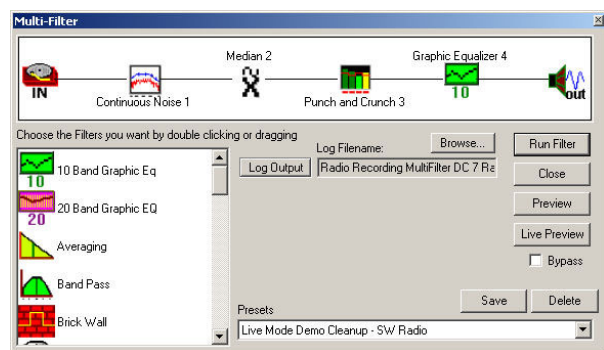
Figure 5 – MultiFilter windows processing our shortwave recording. Notice at the top the functional blocks in processing chain

html. Then download and listen to the two files using Windows Media Player or other player that is wav compatible. Now you can be the judge of how much a difference applying the simplest method of DC 7 restoration has on the audio. Remember, we did this with just three clicks and even less audio technical know-how!

Okay, let's review: We have now learned how to capture and store audio sources, apply a "magical" filter with one click, listen to the "cleaned" audio and store the cleaned audio in a destination file. These processes will be useful in our other DC 7 projects.

❖ Want More Control?

Don't we all? But, if it's more filter control that you want, the Expert Impulse Noise Filter is for you. This can be used instead of the EZ version used in the above example. The Expert version provides much greater control of all filter parameters. However, given all the possible combinations of parameter settings, taking the Expert route could be an all-day endeavor without more of an understanding of the filter operations. That said, for those users who either have the filter design knowledge or who invest time in reading the DC 7 manual, the Expert Impulse Noise Filter will provide a clean result with minimum reduction of the audio's fidelity.

The important point here is DC 7's Simple and Expert approach. Most all features and function in the program can be used at either level, depending on the expertise and/or critical need of the user. This is an excellent concept that the authors of DC 7 have consciously designed into DC 7. Other software writers should follow this approach.

❖ A Simple Radio Application

Since you are reading this in *Monitoring Times*, you're all about radio. Before we get really fancy and go live, let's try a simple application of DC 7 on a file recorded from shortwave.

If you are following along using the wav files on the *MT* site, download and play **Radio Recording 1.wav**. This is an audio file of a German language shortwave news broadcast. You will hear two major problems with the signal. The modulation of the female announcer is very low, while the background radio noise is quite high. While keeping it very simple, what can we do with DC 7?

DC 7 power comes from its ability to combine a number of filters and functional audio blocks into an audio processing chain. Each filter/block is independently customizable in its audio parameters and relative

placement in audio processing chain. DC 7 calls this feature "Multi-Filter."

Start by opening our source file **Radio Recording 1.wav** using the File menu. Next, select MultiFilter from the Filter menu on the top Command line. We'll cover this powerful feature in more depth in Part 2. For now, let's just select the MultiFilter preset titled "Live Mode Demo Cleanup – SW Radio." Figure 5 is a close-up of the MultiFilter window.

Notice the top line. Here the audio processing chain and all of its functional blocks are displayed. Remember, this is the configuration for the preset we have just chosen. Starting from the left side of the top diagram in Figure 5, we see that the input first goes to a Continuous Noise 1 block. This filter is used to remove the white noise hiss on our signal. The "1" indicates that it is the first functional block in our processing chain.

From Figure 5 we see that a Median filter is next in line. This filter reduces small impulse noises, such as crackle or (on a radio signal) atmospheric static discharge noise.

Then comes a functional block with the pugilistic sounding name "Punch & Crunch." It is actually a multi-channel dynamic compressor and expander: hence the name. Here, a weak low-level audio signal, such as we have in our example, is "punched" to a higher level. Don't be confused: this does not simply increase the gain of the audio. If that were all it did, we would increase the level of the background noise as well and achieve very little. Instead, this block picks the program out of the noise. Then it just expands the program material (for our example, a female voice), leaving most of the noise down in the dust.

The fourth and final block, Graphical Equalizer, acts as a sophisticated tone control.

Now we'll run the filter chain and save the destination file.

❖ So, How Does It Sound?

Go back to the *MT* website. Download and listen to the file titled **Radio Recording 1 MultiFilter Preset LMDC-SW Radio.wav**. Now re-listen to **Radio Recording 1.wav**. What do you think?

There is no question that this is a great improvement. The noise is way down and the voice has been pulled out of the mud. Again, stop and think. We have done all this with just a few mouse clicks and NO knowledge of audio processing. That's quite a feat for us, and quite a tribute to DC 7.

❖ Next Month – Live

There is an old adage in the audio business. "No one hears or likes the same things. That's why God created tone controls." Next month we'll dig a bit deeper into the filter blocks and see (i.e., hear) the effect of various filter adjustments. In fact, we'll do a little tweaking of our own and re-do our second example above.

So far, we have DC 7 working on recorded files. How well will DC 7 work in real time with audio from our shortwave receiver? Find out in Part 2, next month.

Field Day Bonus Point Project!

By Carl Herbert, AA2JZ

"Field Day," June 28-29, 2008, isn't that far off! And this year's rules will give your event an additional 100 points if you have an "Educational Activity." (7.3.10, listed among the "Rules") What a golden opportunity to introduce fellow amateurs to "Manhattan" style of building, while providing a usable piece of equipment for the new members to the ranks.

When I read that portion of the rules, I knew that this was an opportunity too good to miss. Our club, "The Citrus County Amateur Radio Club,"(Florida) is fortunate in that we have several newly licensed members. Their ages range from teens to senior, none of whom have had formal training in electronics. They're all neophytes to the hobby and are receptive to learning new phases of the hobby. New to them is "old hat" to the majority of us, but "Elmering" (*one who aids the new members in the hobby*) is one of the mainstays of amateur radio.

Our "Educational Activity," will be a Morse Code Practice Oscillator, built by each of the members desiring one. Yeah, I know, Morse Code isn't a requirement any longer. But there's a lot of ragchewing and DX chasing to be had on the lower ends of the bands. If you can't copy code, you can't work them! Those learning the code now are those who "want to learn," vs. it being a necessity. It makes all the difference in the world.

A "Twin-T" oscillator is one of the easiest circuits to build. There is a minimum of parts, which keeps the cost very low. All of the parts for our activity were scrounged from my "junk box." But then, I keep a very full "junk box." The circuit board measures 1-1/2 by 1-1/4" and could be made larger if desired. There was ample room for construction on this size. See Drawing 1 and Photo 1 for particulars on the unit.

Output from the circuit is about 1000 Hz, with ample audio in for a quiet room. This will be good, should the others not be interested in Morse Code. If you want more gain (louder), feed the output from the circuit to the microphone input of

TWIN-TEE OSCILLATOR

AUDIO OUT
S1
BATTERY LEAD
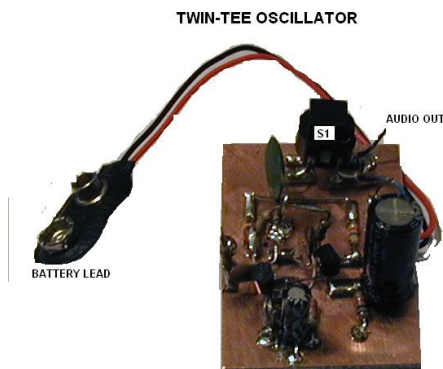
a desktop computer speaker system. You'll have all the volume you want.

❖ Setting Up the Demo

When the great day arrives, I plan to have two builders' stations set up. Both will have an adjustable fluorescent light with magnifier in the middle. The normal collection of needle nosed pliers, cutters, solder, etc. will be provided for their use. I plan to sit opposite from them and observe while they perform the assembly process. By being across from them, I can ward off errors before they become a problem, answer questions that always arise, and provide moral support.

It's difficult to monitor more than two persons building at a given time. The remaining builders will perform their task as Field Day progresses. A "break" from the rigors of contesting is appreciated, especially when other operators want to use the gear, and your next student wants his/her time on the bench.

Along with a plastic bag of parts, I provided each "kit" with an assembly guide. The guide has included in it a schematic of the circuit, a parts list, with identification notes (capacitors marked 103 are .01uf, etc.), helpful hints to make construction an enjoyable event, and website listings related to building circuits, operating, and more.

❖ A Bonus to All!

What a great way to earn an additional 100 bonus points! Teaching others about what I enjoy about the hobby, seeing the look of satisfaction from each of the students when *their circuit* functions, and hopefully, adding more builders and Morse Code operators to the amateur radio ranks. A new member that's proud of the circuit they created is more likely to be a more active "ham," than one who "just gets by" with minimal effort.

Good luck on "Field Day," and remember to keep building.

TWIN-TEE AUDIO OSCILLATOR

C1
R1 C2 R2 R4 9 VDC
R3
AUDIO OUTPUT
Q1 Q2 C5
C3 S1 SPEAKER
Q1/Q2 R5 R6 C4 R7
EBC +

Q1/Q2--2N3904   C1/C3--.01   R1--2K7   R7--1K
S1-- N.O. SWITCH   C2 --.047   R2/R3--51K
NORMALLY OPEN   C4--2.2uf   R4--4K7
(Morse Key)   C5--470uf   R5--22K
R6--200R
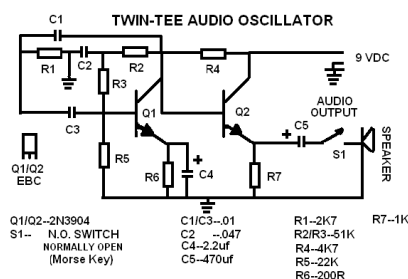
digital channel, and will allow the user to program NAC codes to block transmissions that do not have a matching NAC, including analog traffic on the same frequency.

• Trunking Control Data Output – This function streams decoded trunking control data from your PSR-600 to a personal computer for use with popular third party trunking control channel monitoring software (such as the Butel ARC 500 software package). No data slicer is needed. Through this port the scanner also streams NOAA weather radio SAME alert data.

❖ Overall Rating and Final Thoughts

Those of you who read my reviews on a regular basis know that I am never satisfied and no scanner is perfect. I just haven't found my perfect scanner yet. So, as you might expect, I do have a few complaints with the PSR-600.

In my opinion there are not enough channels per scan list (1800). If I was in a major metro area such as Atlanta and wanted to monitor several trunk systems and conventional frequencies, I would be hard pressed to decide what talkgroups, frequencies, search ranges, etc. I would program within this 1800 memory location limit.

Another area of concern was the dynamic range of the scanner. Since this is essentially a PSR-500 in a different case, I expected that this would be a problem.

This radio has a hot front end; in fact, maybe too hot. Our local FM radio station caused me grief in testing when I added any substantial antenna, such as a ground plane, beam, etc. When I went mobile in higher RF areas I saw this symptom repeated, especially in the VHF high band area of the spectrum. On more than one occasion I was forced to use the global attenuator function when I encountered these conditions to receive in band signals.

While the scanner's audio quality is very good, especially when compared to the PSR-500. I believe this is due to the larger speaker, increased audio output, and the larger case. But I don't like the speaker location. I guess I still like that speaker facing out at me like some of the Bearcat scanners of old.

But audio levels are very good, with good range of control on the volume knob. However, like the PSR-500 I don't like the volume knob/squelch control. Many times, when I would readjust the squelch, the volume knob turned at the same time. I would have to turn the volume back up, then adjust the squelch control. I don't have fat fingers, so that wasn't the cause of the anomaly.

Bottom line, though: As I mentioned before, the GRE is a lot of scanner for the money. No one in the scanner marketplace right now offers a desktop/mobile scanner model that has the listening capability/features that the PSR-600 has. If you are looking for the latest and greatest, the GRE PSR-600 should be on your scanner short list.

The GRE PSR-600 (SCN-19) is available from Grove Enterprises (1-800-438-8155 or www. grove-ent.com/grepsr600.html) for $499.95 plus shipping.

John Catalano, PhD

johncatalano@monitoringtimes.com

WorldStation V4.2: A Program Worth *Buying*?

With all the free radio monitoring software available today, are there programs that are worth *buying*? This question is constantly on my mind as I search for material for this column. In fact, many times it is the limiting factor in finding programs that are "reader worthy."

When I first started writing this column many, many years ago, there was only one radio program available commercially for monitors and just fragments of freely available radio software. But in the 21st century things have really changed. Lots of commercial and freeware radio programs are instantly available on the Internet.

So, today in 2008, what is the answer to our posed question "Is there radio software worth buying?" This month we'll look at WorldStation V4.2, which is a radio program from Dxtra that costs $80 – not exactly inexpensive, which makes it a good test case to answer our question.

❖ What is WorldStation?

WorldStation Version 4.2 (WS) is not just a simple receiver control program. It has the capability to control multiple radios simultaneously, either slaved or independently. And you can do this locally and/or via a network. We'll try all combinations of control, using radios connected to a PC via serial ports and also remote radios through the Internet.

In addition to remote receiver control, WS has receiver audio streaming capabilities. This is the perfect combination for "road warriors" that want to do some monitoring when they are not at home.

WS' other numerous features include an integrated Internet Frequency database, built-in custom databases, Chat server, voice response to commands, many methods of receiver tuning, scheduled radio reception and recording, scanning modes, audio file handling and more.

❖ WS Design Approach

Dxtra's WorldStation takes a different approach from most programs, which usually run from one executable file. Instead WS uses a Client/Server approach. You can think of the Client file as the traditional executable file resident on the hard drive. The Server file is the Client's dedicated link to the network, in our case the Internet. This arrangement makes remote control of your radios, as well as other radios on-line, smooth and quick. Another benefit of this approach is the ability to stream receiver audio with minimal delay.

Using this method WS allows a user the ability to tune and listen to their radio at home while they are away on the road. All it takes is a laptop, an Internet connection, and you'll be back "in your shack" listening to and tuning your receiver.

A version of WS in development (which should be available by the time you read this) will allow multiple people to control one radio. Think about that: Pretty sharp.

Well, WS sounds pretty powerful. But does it work, how well and how easily? And finally, is it worth paying for? Let's dig into WS and get some answers.

❖ Supported Radios

Dxtra is an authorized dealer of TenTec radios, so it is not surprising that WS supports TenTec RX-320, RX-320D, RX-340, RX-35D and the Orion ham transceiver. Currently, the Drake R8A, R8B, Japan Radio 535D and Icom R-75 are also supported. The Icom IC-R1000 driver should be available by the time you read this column.

One driver for a "simple" radio is included in the $80 cost. Other radio drivers are available for an additional cost. It is really a misnomer to call these *drivers*. In reality, each is a complete standalone program customized to the specific
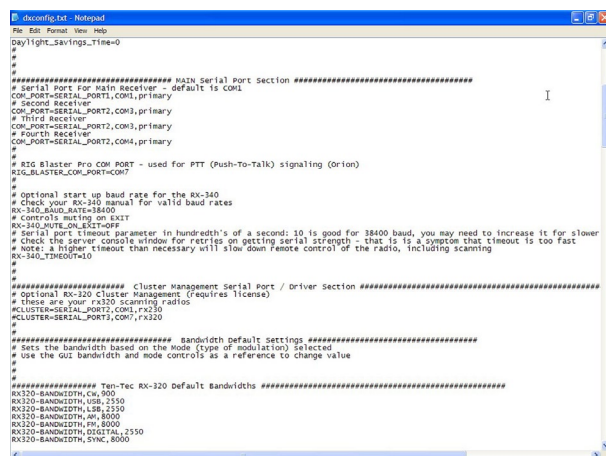
Figure 1- Start with the important configuration file

radio. Check the Dxtra website at **www.dxtra. com** for the latest receivers being supported, plus information and pricing.

❖ WS Requirements

Just about any modern-day CPU will do the job. WS has been reported to run well even on a 100MHz Pentium 1. Free hard drive space of 100M will do the job nicely for WS. However, 256M of RAM is recommended. With the current low cost of RAM, I suggest you upgrade your PC to 1G. This is the most inexpensive way to increase your PC's performance.

A serial port is required for each "local" radio
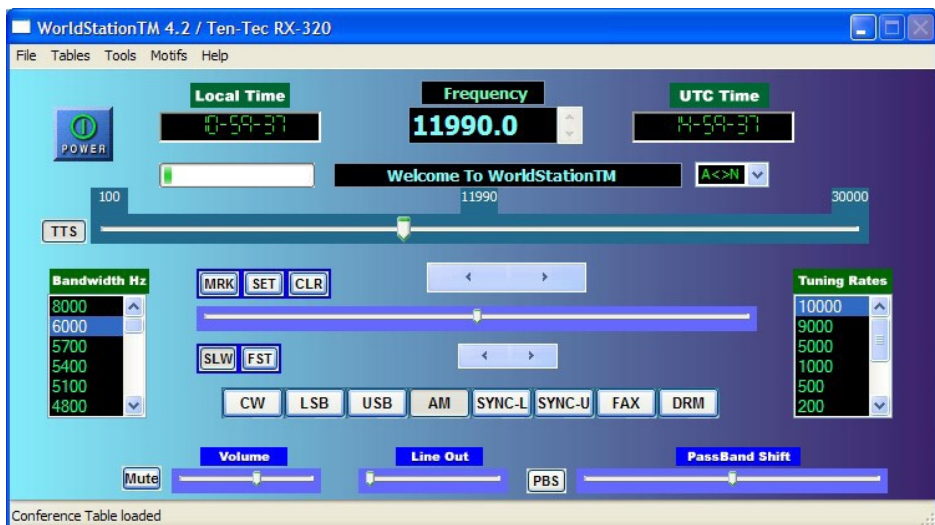
Figure 2 - WorldStation displaying the control screen for our main receiver, the TenTec RX-320D.
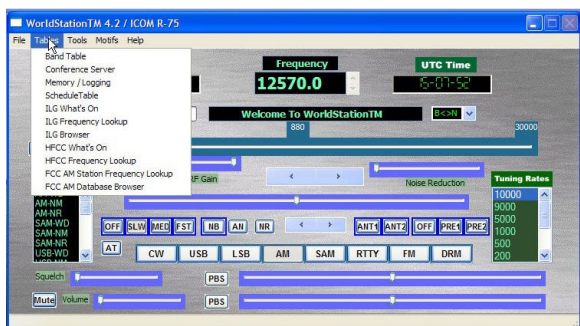
Figure 3 - List of frequency databases accessible from the "Tables" menu

that is to be controlled. Since most PCs these days only have one serial port, a USB to Serial adapter can be a good solution for additional radios. Of course, to take advantage of WS features, a network or Internet connection is needed. A broadband connection is preferable, but WS will work with a dial-up connection.

And finally, to use the program's multi-window capabilities, a 1024 x 768 monitor or higher should be used.

WS version 4.2 works under Windows XP or Vista operating systems. Windows 98 or earlier do not have the server capabilities that WS requires.

Since the PC requirements were not state of the art for WS, we used a four-year-old Dell desktop with a Pentium 4, 1.8GHz CPU with 1G of RAM running Windows XP Home. For receivers we pulled out our TenTec RX-320D and Icom R-75. Although we have a Drake R8 it was not tried with WS.

❖ Getting Started

When you purchase WS, you will receive an automated email that contains the latest program information and a hotlink that brings you to detailed downloading and installation instructions. The first task is to download the file into a separate folder. When the executable file is run it will generate a new folder, which contains a number of files and sub-directories, including the Server and Client files. An "Installation" folder contains our first stop, the important configuration file, **dxconfig.txt**.

❖ FIRST - Configure

Before we run WS for the first time, we must use a program such as Notepad to customize the dxconfig.txt file. This file is where we inform

Figure 4 - Band Table (top) with highlighted line Shortwave Broadcast Band 13050 to 13800 kHz. Scanning results shown in the bottom display.

WS which serial ports we have our receivers connected to.

Figure 1 shows our **dxconfig.txt** file with the two serial ports defined. This critically important step is quite easy and simple. Just remember to follow the syntax and format exactly. The serial ports section of the file that we modified shows that the Main Receiver is on "serial_port1, com1" and that our Second Receiver is on serial port 2.

Our primary radio was a TenTec RX-320D on Com 1. Dxtra provided us with a second radio capability for our Icom R-75 receiver, which enabled us to use the program's multi-radio functions. The R-75 was connected to Com 2 via a Serial to USB converter.

❖ Loading Sequence

As mentioned, in order to use all of WorldStation's capabilities, two programs must be loaded. The Server program must be run first. This program takes very little CPU utilization and can be left running in the background. A click on the Client program and the control panel, seen in Figure 2, will be displayed. Notice that the label at the top left corner reads "WorldStationTM 4.2/Ten-Tec RX-320". This is the screen from which our RX-320D will be controlled. All windows associated with the RX-320, Chat and Conference will have this label.

If non-networked radio control of your receiver(s) is all that is needed, then only the "client" needs to be run and no connection to the Internet is needed. But, to explore all of WS claimed capabilities, we ran the Server with a broadband connection and Client.

❖ Using WS

The receiver control panel in Figure 2 is pretty self-explanatory and easy to use. A number of frequency tuning methods are possible. One method is to simply type the frequency directly into the digital display at the top center. Or we can use the up/down arrows on the right side. Yet another is dragging the pointer along the long horizontal line in the center of the display. More manual tuning methods are detailed in the excellent on-line WorldStation User Guide available at **www.dxtra.com/ws40.html**.

The dropdown menus "Tables" and "Tools" on the Command line at the top of the control panel hold a wealth of useful features. As seen in Figure 3, the Tables menu is the doorway to WS supported frequency databases: ILG, HFCC and FCC AM. Using the "Tools" menu, each of these databases can be created and updated.

But what about the first in the dropdown list, "Band Table"? What is this all about? This is a very useful feature of WS.

❖ Your Key to the Radio Spectrum

That's what the User Manual calls the Band Table seen in the top of Figure 4. The manual suggests that the table be sorted into groups such as Shortwave Broadcast. The band's lowest and high-

est frequencies, mode, tuning step size and starting frequency are preset. Now just click on a band row and it will be "activated" and the receiver will be tuned to the starting frequency in that group. In Figure 4 (top) the 19 meter shortwave band is highlighted and therefore has been activated.

Next click the "Start Scan" button at the top left of the display and you're on your way. The bar graph display at the bottom of Figure 4, which shows active frequencies, is the result. Hovering over a 'Hit' brings up details about that frequency's possible occupants. We have just scratched the surface of the feature-rich Band Table.

The Memory Table, which contains 1000 commonly used utility frequencies and is user customizable, can be used in a similar manner to the Band Table. And finally, the Schedule Table, which we will cover later, is yet another scan-able tool.

❖ Nice Touch

The "TTS" button on the left side of the screen enables the Text To Speech function. TTS is very useful in the multi-radio, multi-windows environment in which we will soon find ourselves. Of course, for those of us older folk who should wear reading glasses it saves us from either finding our glasses or pushing our chair back a few feet to read the screen.

❖ More Info Needed

Perhaps we are closing in on an answer to our "worth buying software" conundrum. But hold on! We have yet to see how WorldStation handles the complexities of its much-touted multi-radio environment.

Next time we'll check out this feature of WS, plus we'll try controlling receivers over the Internet. By then we should clearly have an answer to our question, "Does it ever make sense to *buy* commercial radio software?" See you next time with the answer.

HamCalc

If you ask some of the students that I teach at the local college what my favorite word is, they will say, "free." And most of you are like me: free is good. Well, my friend George Murphy, VE3ERP, continues to offer one of the best software packages for ham radio and radio enthusiast and the selling price – free!

Murph has just released the latest version of his award winning Hamcalc software package (version 98). HAMCALC runs under WINDOWS or MS-DOS and contains over 350 "Painless Math" computer programs for radio amateurs and professionals, used worldwide as a design, reference and learning tool since its introduction in 1993.

"Math is not one of my strong points so when I got my first computer I wrote a program for every equation I had occasion to solve more than once. The collection of programs grew rapidly and in 1993 I compiled them all into one entity which I named "HAMCALC" and gave it away free to anyone who asked. It is still growing and it is still free," said Murph.

Most of the programs can be run in either Metric or Imperial/USA units of measure. This package contains a lot of information not readily found in current popular handbooks and literature. The software is easy to install, use, and understand even by non-technical hobbyists.

So what kind of calculations, operations and task can this software do? Here is a partial list:

555 timer, Antenna Impedance Calculator, Arch Calculator, ASCII Character Codes, Audio Oscillator - dual tone, Audio Oscillator (LM 324), Audio Tone Analyzer, Battery Charger Battery Charger, Bendng Allowance - metals, Bobtail Curtain Antenna, Breakdown Voltage, Capacitor Design Calculator, Capacitor Plate Designer, Capacitors - Trimmer, Capacitors - Variable Plate, Clamping voltage calculator, Coaxial Cable Characteristics, Coaxial Cable RF Chokes & Baluns, Coil Designer, Coil Equation Calculator, Coil Q Calculator, Coil Q Quick Estimator, Coil Tap Properties, Coil Q - True vs. Apparent, Coils - Coaxially Coupled, Coils in Tandem, Copper Wire Data, Decimal to Binary Converter, Distributed Capacitance, Equivalent Values, Fat Dipole, Folded Dipole, Gamma Match Design, Graphs (graph generator), Heat Sink Fins, High Q Antenna Traps, Humidex Calculator, J-Pole End-Fed Zepp Antenna, Ladder Network Analyzer, Link Coupled Tuners, LM317 Regulator, Masonry Estimator, Mechanics Math, Meters (Direct Current), Metronome, Miniquad Coil Shortened Antenna, Mobile Antenna Matching, Mobile / Maritime Whip Antenna, Mobile Whip Antenna Coils, OctaRing Miniature Loop Antenna, Op Amp Constant Current Circuit, Op Amp Noise Figure, Pedometer, Photography Math, Power Supply Design, Quad Antenna Dimensions, Quadratic Equation Calculator, Scale Speed Calculator, Schmidt Trigger Op Amp, Short Center-Loaded Dipole, Short Off-Center Loaded Dipole, Single Wire Antenna System, Small Transmitting Loop Antennas, Speed Time & Distance Calculator, Stopwatch, Tapped Coil Calculator, T-Match - dipole to 600 ohm line, Toroid inductors, Transmission line node locator, Tuned Circuit Design, Variable Capacitor Plate Designer, Voltage divider - Thevinin, Wall Wart Properties, Wheatstone Bridge Calculator, Wind Chill Factor, Windom Antenna, Wire Antenna Index, Yagi 3-Element Beam Design, Zepp Double Extended Antenna, and Zepp multi-band antenna.

George Murphy no longer mails HAMCALC on CD-ROM; instead, authorized copies can be downloaded free (1.2Mb zip file) from the internet at the *CQ* magazine website at **www.cq-amateur-radio.com/HamCalcem.html**.

So if you want some neat software to do a lot of neat things in the world of radio and electronics, HalmCalc is just the ticket you are looking for, and, oh yes, it is free!

The Great Radio Sitcoms

Old Time Radio author and historian Jim Cox has written another of his fascinatingly detailed works, this one covering situation comedies.

Sitcoms have been abundant on television for many decades, but like many of television's other programming concepts, sitcoms were initially invented for radio. Persons over 65 will remember many of the programs Jim writes about in this book, but younger persons may be familiar with some of the influences of these programs on our culture without being aware of their origins. Examples: "living the life of Riley" is a phrase from the program *The Life of Riley.* The phrase may predate the radio program; if so, the program has greatly extended it. The most well-known example of age denial comes from *The Jack Benny Program*, Jack forever remaining 39.

Some of the sitcoms had comic book or comic strip tie-ins: *Blondie* and *Archie Andrews* are examples. Some involved celebrities: *The Jack Benny Program* (Jack Benny), *The Adventures of Ozzie and Harriet* (Ozzie, Harriet, Ricky, and David Nelson), and *The George Burns and Gracie Allen Show* (George and Gracie).

Other programs whose names are remembered fairly well in entertainment history include the controversial *The Amos 'n' Andy Show, The Great Gildersleeve,* and my favorite, mostly because of its outrageous puns, *Fibber McGee & Molly.* A pun example (not one of those mentioned in this book, but one of my favorites) goes like this:

Fibber: Yup, I was a baseball pitcher in my younger days.
Molly: I never knew that. Southpaw?
Fibber: Nope, Midwest, Maw.

Also, "Fibber McGee's closet" is a phrase that came from the program, but outlasted it by many years.

Several of the programs moved to television, but most did not, as it became apparent that radio comedy did not quite fit the new medium. Most notable of the successful transfers was *My Favorite Husband,* starring Lucille Ball who moved to TV to star in *I Love Lucy* and several of its descendants.

Like radio soap operas, radio sitcoms seem quaintly innocent compared to television mutations of the formats. Radio comedies managed also to be very funny without embarrassing the listeners.

Other radio comedies that were remembered until recent decades include *Duffy's Tavern, Our Miss Brooks*, *The Bickersons,* and *Lum and Abner*.

Author Cox covers the shows and personalities mentioned above, plus several others for a total of 20 major sitcoms and 13 slightly less well known programs.

Jim provides some context throughout the book about the rise and fall of radio as America's main entertainment medium for more several decades. Also, for each program covered, he delivers the details, like the directors, the writers, the orchestra leaders, the vocalists, the sound effects technicians, the announcers, the recurring casts, the supporting casts, the sponsors, the musical themes, the ratings, the actual on-air details (dates, times of day, days of week, and network), and existing archival material. For many of the stars, cast members, and support staff, he tells us some of their history before and after their times on the radio series, and about any movies in which they also acted.

The Great Radio Sitcoms (ISBN 978-0-7864-3146-5) was published late last year by McFarland, Jefferson, NC. Their website address is **www.mcfarlandpub.com** and their phone number is 800-253-2187. The book contains photos, appendices, notes, bibliography, and an index. It is 296 pages, in hardcover, measures 7 by 10-inches and retails for $55.00.

– Review by Andy Ooms (*oomspine@msn.com*).

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Attention all those wanting to know what's going on with ham radio in the New Orleans area, check out: **http://groups.yahoo.com/group/GNOAmateurRadio/**

MT BLOGS
Blogs offer an opportunity for columnists to share information that does not make their columns. The news might be too timely for deadline, too short, confined to a small geographical area, too far away to be heard in North America, or even off the columnist's regular "beat." Bookmark these blogs for frequent visits!

MT: AMERICAN BANDSCAN
http://americanbandscan.blogspot.com/ - by Doug Smith

MT: EDITOR'S DESK
(Corrections posted here as well as on MT website)
http://mt-editor.blogspot.com/ - by Rachel Baughn

MT: FED FILES
http://mt-fedfiles.blogspot.com/ - by Chris Parris

MT: MILCOM
http://mt-milcom.blogspot.com/ - by Larry Van Horn

Larry's Monitoring Post
http://monitor-post.blogspot.com/ - by Larry Van Horn

MT: SHORTWAVE
http://mt-shortwave.blogspot.com/- by Gayle Van Horn

MT: UTILITY WORLD
http://mt-utility.blogspot.com/- by Hugh Stegman

Please note: The correct name for the company listed in May as "Incident Command Post" is Incident Command Page; Their ad appeared on page 23 of the that issue.

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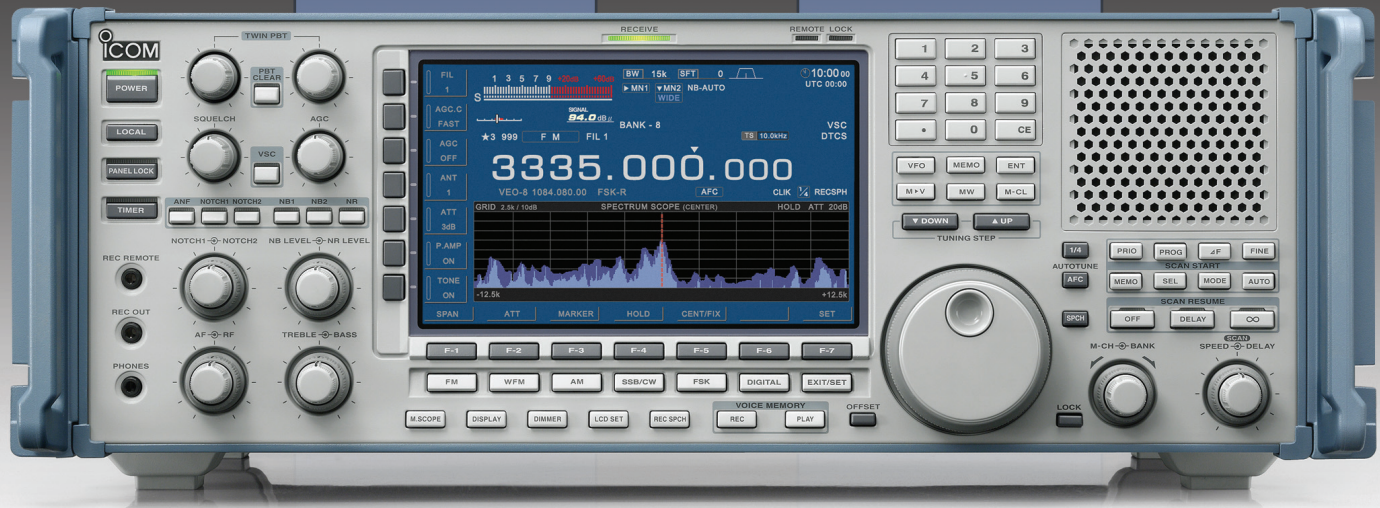
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